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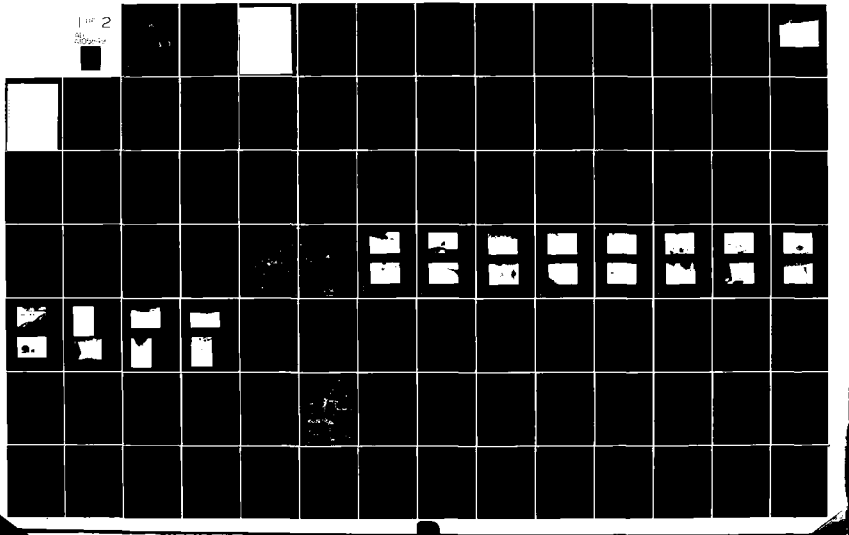

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REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A105 849
	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report Bear Gulch Pond Dam Mohawk River Basin, Schoharie County, N.Y. Inventory No. 1089	5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) KENNETH J. MALE	8. CONTRACT OR GRANT NUMBER(s) DACW51-81-C-0014
9. PERFORMING ORGANIZATION NAME AND ADDRESS C.T. Male 3000 Troy Road Schenectady, New York 12309	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Department of the Army 26 Federal Plaza New York District, CofE New York, New York 10287	12. REPORT DATE 18 August 1981
	13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Department of the Army 26 Federal Plaza New York District, CofE New York, NY 10287	15. SECURITY CLASS. (of this report) UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

LEVEL II

AD A105849

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; Distribution unlimited.

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from R...

Original contains color plates: All DTIC reproductions will be in black and white

18. SUPPLEMENTARY NOTES

National Dam Inspection Program.
Bear Gulch Pond Dam (NY 01089),
Mohawk River Basin, Town of Summit,
Schoharie County, New York.
Phase I Inspection Report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability

Bear Gulch Pond Dam
Schoharie County
Mohawk River Basin

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Examination of available documents and visual inspection of the dam revealed conditions which constitute an immediate hazard to human life and property. The dam is assessed as "unsafe, emergency" for the following reasons: → (over)

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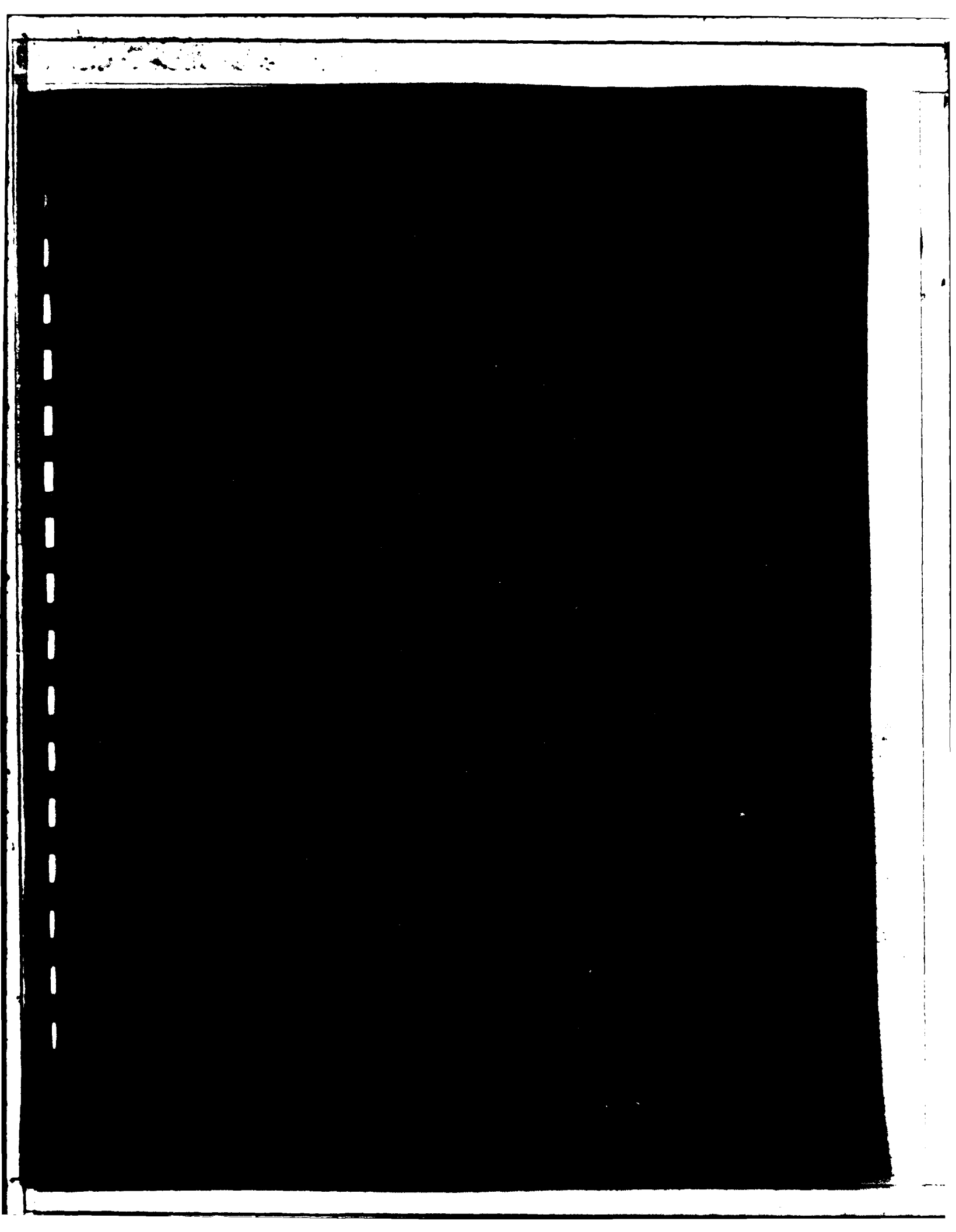
(1) A major, active slough on the downstream side of the embankment near the left abutment which gives reason to conclude that the dam is in imminent danger of failure;

(2) Large seepages, of about 50 gallons per minute each, which are taking place at a location between the reservoir drain (outlet pipe) and the right abutment, and from around the outside of the outlet pipe itself.

(3) Spillway capacity which is considered "seriously inadequate" in accordance with Corps of Engineers' screening criteria for review of spillway adequacy. Hydrologic and hydraulic analysis indicates that maximum spillway discharge capacity is only about 5% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. It is judged that failure due to overtopping would significantly increase the hazard to loss of life downstream from that which would exist just prior to failure.

As a result of the "unsafe, emergency" condition of the dam, it is recommended that the pond be drained immediately to the level of the reservoir drain (outlet pipe) and that the reservoir drain be kept fully open pending the results of additional investigation. As a result of the visual inspection on May 5, 1981, a telegram recommending that the pond be drained immediately was sent to the Governor and the Owner on May 8, 1981. By letter dated May 12, 1981 the NYS Department of Environmental Conservation ordered the Owner to immediately drain the pond by opening the reservoir drain. On May 14, 1981 the Owner partially opened the reservoir drain and started draining the pond. Reportedly, the pond is presently being drained, but progress has been slow.



PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

BEAR GULCH POND DAM, NY 01089

PHASE I INSPECTION REPORT

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NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No.: NY 01089

Name of Dam: Bear Gulch Pond Dam

State Located: New York

County: Schoharie

Municipality: Summit

Watershed: Mohawk River Basin

Stream: Bear Gulch Brook

Date of Inspection: April 29 & May 5, 1981

ASSESSMENT

Examination of available documents and visual inspection of the dam revealed conditions which constitute an immediate hazard to human life and property. The dam is assessed as "unsafe, emergency" for the following reasons:

1) A major, active slough on the downstream side of the embankment near the left abutment which gives reason to conclude that the dam is in imminent danger of failure.

2) Large seepages, of about 50 gallons per minute each, which are taking place at a location between the reservoir drain (outlet pipe) and the right abutment, and from around the outside of the outlet pipe itself.

3) Spillway capacity which is considered "seriously inadequate" in accordance with Corps of Engineers' screening criteria for review of spillway adequacy. Hydrologic and hydraulic analysis indicates that maximum spillway discharge capacity is only about 5% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. It is judged that failure due to overtopping would significantly increase the hazard to loss of life downstream from that which would exist just prior to failure.

As a result of the "unsafe, emergency" condition of the dam, it is recommended that the pond be drained immediately to the level of the reservoir drain (outlet pipe) and that the reservoir drain

be kept fully open pending the results of additional investigation. As a result of the visual inspection on May 5, 1981, a telegram recommending that the pond be drained immediately was sent to the Governor and the Owner on May 8, 1981. By letter dated May 12, 1981 the NYS Department of Environmental Conservation ordered the Owner to immediately drain the pond by opening the reservoir drain. On May 14, 1981 the Owner partially opened the reservoir drain and started draining the pond. Reportedly, the pond is presently being drained, but progress has been slow.

While the pond is being drained, and within 1 month after receipt of this report by the Owner, it is recommended that the following detailed engineering investigations be started by a qualified, registered professional engineer:

1) Investigate the causes of the slough near the left end of the dam.

2) Investigate the causes of the seepage between the outlet pipe and the right abutment, the seepage along the outside of the outlet pipe, and the soft, wet area at the downstream toe of the dam between the outlet pipe and the left abutment.

3) Perform a detailed hydrologic and hydraulic analysis to better assess spillway capacity. This should include a more accurate determination of the site specific characteristics of the watershed.

Also, a failure analysis should first be performed to evaluate the consequences to the downstream area if the pond is filled, voluntarily or involuntarily, to any level above the reservoir drain (outlet pipe). A preliminary hydrologic and hydraulic analysis should be done to evaluate the extent to which the pond may fill involuntarily during heavy rainfall. An extension of the analysis done as part of this report indicates that starting with the pond empty and the reservoir drain (outlet pipe) fully open, 1/2 PMF would not overtop the dam but would crest about 1.4 feet below the top or about 2.1 feet above the spillway crest. The PMF would overtop the dam by about 1.2 feet.

Based on the failure analysis and the preliminary hydrologic and hydraulic analysis, the Engineer should recommend whether the dam should be breached until permanent repairs can be made.

Because of other deficiencies, the following additional investigations should be started within 6 months after receipt of this report by the Owner. The investigations should be performed by a qualified, registered professional engineer.

1) Investigate the deterioration of the rock in the left abutment immediately downstream of the spillway culvert.

2) Investigate the causes of the bulging of the dry stone masonry wall which retains the downstream side of the embankment.

3) Investigate the cause of the large structural cracks in the concrete of the right wall and top of the spillway culvert.

4) When the pond is drained, investigate the condition of the reservoir drain (outlet pipe), sluice gate, and gate stem.

The results of all the investigations will determine the type and extent of remedial work required to restore the safety of the dam. A qualified, registered professional engineer should design and observe the construction of any necessary remedial work. Any necessary remedial work should be completed within 18 months after receipt of this report by the Owner.

970 The following remedial work should be completed by the Owner within 12 months after his receipt of this report. Where engineering assistance is indicated, the Owner should engage a qualified, registered professional engineer. Assistance by such an engineer may also be useful for some of the other work.

1) Repair the erosion that has occurred at the downstream edge of the soft, wet area near the toe of the dam between the outlet pipe and the left abutment in accordance with design and field observation of the work by an engineer.

2) Remove trees and their root systems from a zone 25 feet wide next to the downstream toe of the dam, from the dry stone masonry wall which retains the downstream side of the embankment, and from the embankment between the top of the masonry wall and the crest of the dam, all in accordance with specifications and field observation of the work by an engineer. Continue to keep these same areas clear by cutting, mowing, and cleanup at least annually.

3) Construct erosion protection for the crest of the dam and for the upstream slope in the zone of wave action in accordance with design and field observation of the work by an engineer.

4) Develop and implement effective routine operation and maintenance procedures. The outlet gate should be exercised regularly. The Owner should visually inspect - not just casually look at - the dam and appurtenant structures at least once a month.

5) Institute a program of comprehensive technical inspection of the dam and appurtenances by an engineer on a periodic basis of at least once every two years.

6) Develop a surveillance program for use during and immediately after heavy rainfall or snowmelt. Also, develop an emergency action plan outlining action to be taken to minimize the downstream effects of an emergency, together with an effective warning system.

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LICENSED PROFESSIONAL ENGINEER
KENNETH J. MALE
25004
& LAND SURVEYOR
OF THE STATE OF NEW YORK

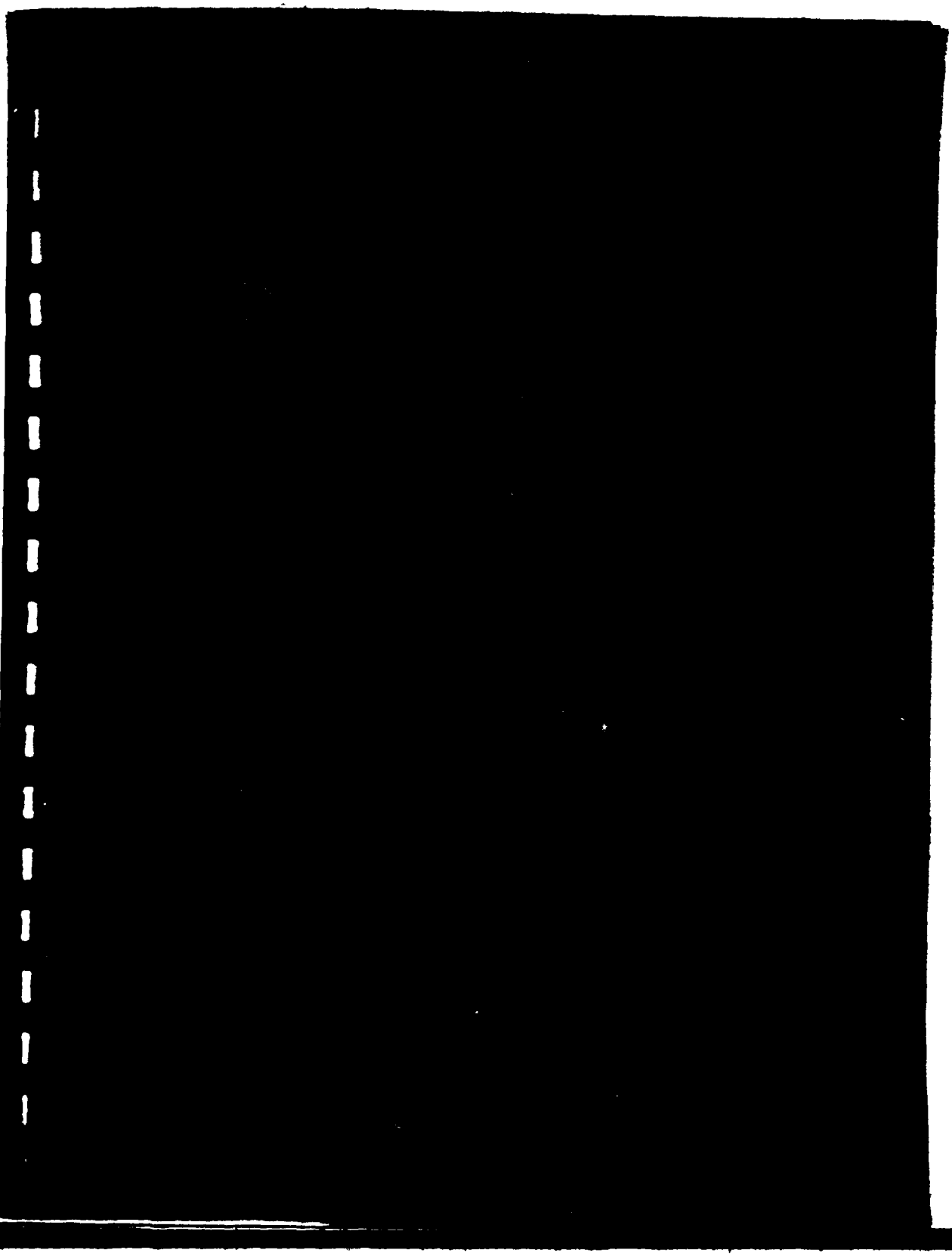
Kenneth J. Male
President
C. T. Male Associates, P. C.
NY PE 25004

Approved by:

Col. W. M. Smith, Jr.
New York District Engineer
Corps of Engineers

Date: 18 Aug 81

Overview Photo - Bear Gulch Pond Dam - 5/5/81



NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

NAME OF DAM: BEAR GULCH POND DAM, ID NO. NY 01089

SECTION 1

PROJECT INFORMATION

1.1 GENERAL

a. Authority

The National Dam Inspection Act, Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspection throughout the United States. The New York District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within New York State. C. T. Male Associates, P.C., has been retained by the New York District to inspect and report on selected dams in the State of New York. Authorization and notice to proceed was issued to C. T. Male Associates, P.C., under a letter from Michael A. Jezior, LTC, Corps of Engineers. Contract No. DACW51-81-C-0014 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The purpose of the inspection program is to perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public, and thus permit correction in a timely manner by non-Federal interests.

1.2 DESCRIPTION OF PROJECT

a. Location

The dam is located on Bear Gulch Brook about 3 miles south of the Village of Richmondville. The dam at its maximum section is at Latitude 42 degrees - 35.9 minutes North, Longitude 74 degrees - 35.6 minutes West.

Access to the dam is from Interstate 88 to the north, then south via State Route 10 to the hamlet of Summit, and then north via Charlotteville Road (County Route 6) and Bear Gulch Road (County Route 56) to the dam (see Vicinity Map, and Drainage Area Map Appendix C-5).

The official and popular name of the dam is Bear Gulch Pond Dam and the official and popular name of the impoundment is Bear Gulch Pond.

b. Description of Dam and Appurtenances

Bear Gulch Pond Dam is an earth dam with a vertical dry stone masonry wall on the downstream side. The dam has a culvert spillway at the left abutment. The embankment is about 315 feet long (including the spillway) by about 18 feet high. The upstream slope of the dam averages 3H:1V and is irregularly covered with broken shale and sandstone riprap. The top width of the dam averages 30 feet and includes a shale roadway.

Near the left abutment there is a culvert spillway that consists of 3 culvert pipes: a 42-inch riveted steel pipe, a 30-inch corrugated metal pipe, and a 12-inch riveted steel pipe. All three pipes are about 10 feet long and discharge into a concrete box culvert through the dam. The box culvert averages about 6 feet wide by 5 feet high, has a concrete top which in places is supported by I-beams and plate arches, and empties into about a 10-foot-long channel at its downstream end. The channel has a natural rock left training wall, a concrete right training wall, and a concrete-paved bottom. The channel empties into a deep rock gorge downstream.

Near Sta 2+00 there is a wooden gate house, on a concrete headwall, located about 10 feet upstream of the dam crest. A rack gear gate operating mechanism for the slide gate in the 18-inch riveted steel outlet pipe is located in the gate house. The outlet pipe runs through the dam and discharges to a flat area that drains into the gorge downstream of the dam.

c. Size Classification

In accordance with Recommended Guidelines (Reference 1), Bear Gulch Pond Dam is classified as "small" in size because its maximum storage capacity at the top of the dam is 391 acre-feet (within the 50 to 1,000-acre-foot range). The height of the dam is about 18 feet.

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d. Hazard Classification

In accordance with Recommended Guidelines (Reference 1), Bear Gulch Pond Dam is classified as having a "high" hazard potential. This is because it is judged that failure of the dam would significantly increase flows downstream which could cause loss of more than a few human lives and excessive property damage. Downstream development that could be damaged or destroyed by a dam failure include: about six homes with outbuildings and farm property located near the stream about 2,000 to 6,000 feet downstream (vertical drop in elevation from the dam to these homes is as much as about 700

feet, see Photo A-13A), and the Village of Richmondville about 3 miles downstream where the brook runs under several buildings and State Route 7 (see Photo A-13B, vertical drop from the dam to the Village is about 1,000 feet).

e. Ownership

It is believed that the dam was originally constructed in the early 1900's for John Westover. The present Owner of the dam is:

Richmondville Water Company
c/o Maynard Tillapaugh
98 North Grand Street
Cobleskill, New York 12043
(518) 234-2952 (home)
(518) 294-7252 (feed store in Richmondville)

Mr. Tillapaugh seems to be the only surviving shareholder of the Richmondville Water Co., having acquired his 10 shares in about 1950 as part of the feed store property in Richmondville that he purchased at that time and presently operates. Mr. James S. Van Deusen, Schoharie County Highway Superintendent, indicates that the County does not own the dam or the road across the dam, but that County ownership and maintenance stop at the end of the pavement just before the right abutment of the dam.

f. Operator

Day-to-day operation of the dam is the responsibility of:

Maynard Tillapaugh
(address and phone number as previously given)

The unpaved road across the top of the dam is maintained by the Town of Summit Highway Department.

g. Purpose of Dam

The dam was originally constructed to store water for use at downstream water wheels along the creek. Reportedly there were as many as seven sawmills that once used the water power. A water-powered feed grinder at the Operator's feed store was last used in 1963. Presently the impoundment is used for recreational purposes.

h. Design and Construction History

The dam is believed to have been constructed in the early 1900's for John Westover. The designer and construction contractor for the dam are not known.

In 1970 the Town of Summit and Schoharie County Highway Department personnel operated the gate and drained the pond. The

Town Highway Department put large rocks with a shale cover on the upstream slope of the dam. Also, it appears that the roadway along the top of the dam was raised about 2 feet. The outlet pipe was also extended about 40 feet upstream and a riser pipe intake was added to the upstream end.

In the fall of 1978 the Town Highway Department installed the three metal culverts presently at the upstream end of the spillway. In 1980 the Town Highway Department placed about 8 inches of new shale cover on the roadway across the dam.

There is no knowledge or record of other construction, modification, or major repair of the dam. Refer to Section 2 of this report, as well as to the Engineering Data Checklist in Appendix F2, for a complete discussion of the design and construction history. Other engineering data is included in Appendix F3. No drawings for the dam could be located.

i. Normal Operating Procedures

The Operator visits the dam randomly, perhaps 5 to 6 times during the summer and less often at other times. The water level is normally at or just above the spillway crest and the outlet pipe gate is normally closed. During dry weather, however, the outlet gate is sometimes opened to maintain some flow in the brook downstream of the dam.

1.3 PERTINENT DATA

a. Drainage Area (square miles) — 0.74

b. Discharge at Dam Site (cfs)

Culvert Spillway (W.S. at top of dam)	103
Outlet Pipe (normally closed - estimated potential with W.S. at spillway crest)	31
Maximum Known Flood	Unknown

c. Elevation (feet - NGVD)

All elevations are based on a normal water surface for the pond at EL 2110 as listed in the Gazetteer of Lakes (Reference 25), assumed to be at the spillway crest (invert of the largest spillway culvert), and are in feet above mean sea level NGVD (National Geodetic Vertical Datum of 1929).

Top of Dam	2113.5
Design High Water	Unknown
Spillway Crest	
- 42-inch culvert invert	2110.0
- 30-inch culvert invert	2109.9
- 12-inch culvert invert	2110.7
Entrance Invert of Outlet Pipe	2096 ±

d. Reservoir Length (feet) - at spillway crest 3400 +

e. Reservoir Surface Area (acres)

Top of Dam	56 +
Spillway Crest	45.8

f. Reservoir Storage (acre-feet)

Top of Dam	391
Spillway Crest	214

g. Dam

Type - Earth with dry stone masonry wall on downstream side.
Length - About 315 feet including spillway.
Height - About 18 feet.
Top Width - Averages 30 feet.
Side Slopes - Upstream - Averages 3H:1V.
- Downstream - Vertical.
Zoning - None known.
Impervious Core - None known.
Cutoff - None known.
Grout Curtain - None known.

710 h. Spillway

Type - Culvert spillway consisting of 3 culverts at upstream side of dam: 42-inch riveted steel pipe, 30-inch corrugated metal pipe, and 12-inch riveted steel pipe. These pipes discharge into a concrete box section through dam that averages 6 feet wide by 5 feet high. Part of the concrete top of the culvert is supported by I-beams and steel-plate arches.
Length of Weir - N/A.
Upstream Channel - Reservoir sides form channel that tapers in to width of spillway. Bottom of reservoir slopes up to inverts of culverts.
Downstream Channel - Box culvert of spillway discharges into 10-foot-long channel with natural rock on left and concrete training wall on right. Channel empties into very steep rock gorge at its downstream end with an immediate drop into gorge of about 25 feet.

i. Outlet Pipe (reservoir drain)

Size - 18 inch diameter.
Description - 18-inch riveted steel pipe through dam. Appears to be laid-up stone around pipe as it passes through the embankment.
Control - Slide gate in pipe at upstream side of dam with a rack gear operating mechanism located directly above in a gate house.

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SECTION 2

ENGINEERING DATA

2.1 DESIGN DATA

a. Geology

There is no geologic information available in the data for this dam. The following information was obtained from current geologic maps and publications (References 26 and 27), as well as from the site visit.

Bear Gulch Pond Dam is located in the Catskill Section of the Appalachian Plateaus Province. It is on the northern slope of the dissected plateaus that comprise the Appalachian Plateaus region of New York State. Bedrock in the vicinity of the dam consists of flat-lying shale and sandstone of Middle Devonian age.

No surficial geology map is available for the area in which the dam is located.

b. Subsurface Investigations

No records of subsurface investigations are available for this dam site.

c. Dam and Appurtenances

No design data are available for the dam or appurtenant structures. The original designer of the dam is not known.

2.2 CONSTRUCTION HISTORY

a. Initial Construction

The present dam is believed to have been constructed in the early 1900's for John Westover. A report on the dam (see Appendix F3-7) indicates that dam was constructed in 1871 but the Owner feels that this date is for an earlier dam that was built somewhat further upstream. The construction contractor for the present dam is not known.

No drawings or other data concerned with the original construction could be found. A brief review of the known construction history, as can be determined from the available data, can be found on Appendix F2-2.

b. Modifications, Repairs, and Maintenance

An early newspaper article (believed to date from about 1930, see Appendix F3-4) states that the "head of the dam" (i.e., the

downstream dry stone masonry wall), which "had been allowed to fall in decay", was repaired.

70 In 1970 the Town of Summit and Schoharie County Highway Department personnel operated the outlet gate and drained the pond because of the settlement and sliding of portions of the upstream slope of the dam. The Town Highway Department placed large rock with shale cover on the upstream slope to repair this damage. Also, it appears that the roadway along the top of the dam was raised about 2 feet to a uniform elevation. The outlet pipe was also extended about 40 feet upstream, and a steel riser pipe intake, about 6 feet high and 3 feet in diameter, with a trash rack on top, was added to the upstream end. The outlet gate mechanism is believed to have been repaired at the same time.

In the fall of 1978 the Town Highway Department installed the three metal culverts presently at the upstream end of the spillway. In 1980 the Town Highway Department placed about 8 inches of new shale cover on the roadway across the dam.

Inspection reports and correspondence with the NYS-DEC (discussed later in Section 2.3) make reference to actual and other proposed modifications and repairs to the dam which apparently were never carried out. There is no knowledge or record of other construction, modification, or major repair of the dam.

2.3 OPERATION RECORD

a. Inspections

There is no known record of inspection of the dam by the Owner.

A State of New York Conservation Commission Dam Report dated July 16, 1920 (see Appendix F3-1) describes the dam as "O.K. Condition".

On December 22, 1969 personnel from the NYS-DOT and the New York State Conservation Department (now NYS-DEC), accompanied by the Schoharie County Highway Superintendent, inspected Bear Gulch Pond Dam. A report on the outcome of this inspection along with a transmittal letter, both dated January 2, 1970, can be found starting on Appendix F3-6. The report described the dam, records available concerning the dam, and problems of the dam. The report noted that there was one foot of freeboard between the low point at the top of the dam and the frozen water surface. It indicated that there was "about a one inch wide settlement crack, extending from top to the bottom" in the right wall of the spillway and that there was some deteriorated concrete along the base of the same wall. It noted that the surface of the concrete slab at the downstream end of the spillway was damaged due to cavitation. It also noted that there was a 4-foot-diameter

riveted steel pipe (boiler pipe) in the upstream end of the concrete box culvert portion of the spillway that reduced the capacity of the spillway by 41 percent.

The report on the inspection of December 22, 1969 indicated that snow cover prevented a more thorough inspection and that "there is no doubt that the lower elevation of the top of the dam and the limited area of the boiler pipe opening will be conducive to cause an overtopping of the dam when a rain and thaw cycle occurs in the drainage area." The report also recommended several safety measures to be implemented until a more thorough inspection could be made. These measures included removing the existing 4-foot boiler pipe, extending the existing concrete box culvert upstream to replace the removed pipe, and raising the lower part of the top of the dam to the existing road elevation over the spillway.

A letter from the Water Resources Commission to the Schoharie County Highway Superintendent dated January 8, 1970 can be found starting on Appendix F3-10. This letter discusses the December 22 inspection, comments on the ownership of the dam, and discusses various means to make the needed repairs to the dam.

A letter of February 3, 1970, from the NYS-DEC to the Owner (see Appendix F3-13) discusses a January 29, 1970 inspection of the dam. The letter indicated that "settlement and sliding of earth materials forming the upstream slope of the dam and shoulder of the road was occurring which, if allowed to continue, might imperil the stability of the structure." The letter noted that Town and County personnel had partially opened the sluice to reduce the hydrostatic pressure on the dam and to begin draining the pond. The letter noted that the gate stem was broken off below the water level (divers fastened a cable to the stem and the gate was opened with a winch), and advised the Owner that he repair the stem so that the valve could be operated in an appropriate manner. Finally the letter informed the Owner that "No attempt is to be made to impound water in Bear Gulch Pond until such time as corrective measures are undertaken to reconstruct the dam and alleviate the hazardous conditions."

A letter of June 16, 1970 to the NYS-DEC from the NYS-DOT (see Appendix F3-15) discusses the review of a sketch plan for proposed repairs to the dam and spillway. No evidence of the sketch plan could be found and from the site inspection it is believed that none of the proposed repairs to the dam or spillway mentioned in the letter were carried out.

A November 19, 1970 inspection report by the NYS-DEC (see Appendix F3-16) notes that the dam was recently reconstructed under a permit and that the upstream slope still needed additional riprap. The report indicated that the dam was in satisfactory condition and that periodic maintenance was being performed.

b. Performance Observations

Other than the observations made in the various correspondence and reports concerning inspection of the dam (discussed previously in Section 2.3a), there are no other known records of performance observations.

c. Water Levels and Discharges

There are no known records of water levels or discharges at the dam.

d. Past Floods and Previous Failures

There are no known records of past floods at or previous failures of the dam. A newspaper article (believed to date from about 1930, see Appendix F3-4) indicates that the "head of the dam" (i.e., the downstream face) was once in bad shape and subsequently repaired but the cause of that condition is not known. A January 29, 1970 inspection of the dam (see letter of February 3, 1970, Appendix F3-13) noted that the upstream slope of the dam was settling and sliding. The cause of this problem is also not known.

At the time of our first field inspection of the dam on April 29, 1981 a portion of the downstream face of the dam just to the right of the spillway was actively sloughing. This slough is discussed in detail in Section 3, Visual Inspection.

2.4 EVALUATION

a. Availability

As listed on Appendix F1, various engineering data and records are available in the files of the Dam Safety Section of the NYS-DEC and the Division of Fish and Wildlife of the NYS-DEC. This data was reviewed, and copies of the records significant to the dam are included in chronological order in Appendices F3 and G. Appendix F2, Checklist for General Engineering Data and Interview with Dam Owner, also contains pertinent engineering information.

b. Adequacy

Available data consisted of several inspection reports, correspondence, a newspaper article, old photos of the dam (not included in report) and a sketch with pond depths. Such data as design/construction drawings, record drawings, specifications, design calculations, data on foundation and embankment soils, and operation and performance data were not available. The lack of such in-depth engineering data does not permit a comprehensive review. Therefore, the available data was not adequate by itself to permit an assessment of the dam.

c. Validity

The proposed modifications commented on in the June 16, 1970 letter approving a sketch plan of modifications for the dam (see Appendix F3-15) were never built based on our visual inspection. The modifications not built include a new spillway culvert and an emergency spillway over a lowered portion of the top of dam.

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SECTION 3

VISUAL INSPECTION

3.1 FINDINGS

a. General

Bear Gulch Pond was inspected on two occasions. One member of the inspection party (see Appendix B-1), Ed Vopelak, made the first inspection on April 29, 1981. Mr. Vopelak accompanied Mr. George Koch and Mr. Ken Harmer of the Dam Safety Section of the NYS-DEC. Also present at this inspection were Mr. Maynard Tillapaugh, the apparent Owner; Mr. Larry Dibble, Highway Superintendent of the Town of Summit; and Mr. Kevin P. Neary, Director of the Schoharie County Office of Disaster Preparedness. The weather was cool with intermittent rain. The water surface was at about EL 2110.1 or about one inch higher than the invert of the largest upstream spillway culvert.

On May 5, 1981 the full inspection party inspected the dam without any representatives from the NYS-DEC. All others present at the first inspection were there, as well as Mr. Edwin Dimmler, Supervisor of the Town of Summit. The weather was partly cloudy and warm. The water surface was at about EL 2109, or about 1 foot below the spillway culvert, and the outlet pipe was open.

The Visual Inspection Checklist is included as Appendix B, while selected photos taken during both inspections are included in Appendix A and as the Overview Photo at the beginning of this report. Appendix A-1 is a photo index map.

b. Dam

Several conditions which adversely affect the stability of the dam are described in the paragraphs below.

Slough at Left End of Dam - A major slough has occurred at the left end of the dam between Stations 0+25 and 0+70, immediately to the right of the spillway culvert at the left abutment.

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Photo A-2B shows the general location of the spillway culvert and the slough (which is on the downstream side of the dam between the two piles of dirt on the crest). The piles of dirt had been placed on the crest so that vehicles using the roadway on the crest of the dam would not drive over the edge of the slough.

The slough extends about 5 feet upstream from the downstream edge of the crest of the dam (next to the rusty barrel between the two piles of dirt in Photo A-3A).

Photo A-4B, which was taken on April 29, 1981, approximately one week before the inspection of record, is a view of the slough taken from the downstream side of the dam. On April 29 the reservoir had not yet been lowered, water was discharging from the spillway culvert and cascading over the thin-bedded shales and sandstones on the left abutment, and seepage water was discharging from the exposed embankment in the slough. At the time of the inspection on May 5, the reservoir had been lowered approximately 1 foot; no water was discharging from the spillway culvert; and, although no seepage water was flowing out of the exposed embankment in the slough, the embankment material appeared wet and shiney up to an elevation a few feet below the level of the pond.

Prior to April 29 the Town Highway Department had dumped a load of rock into the slough from the roadway at the crest of the dam, but because of the steepness of the downstream channel this dumped rock had cascaded about 50 to 100 feet down the channel and was not effective in stabilizing the slough. Photo A-5A is a view of the downstream channel taken from the top of the slough. The crest of the dam and the top edge of the slough are visible along the bottom of the photograph. Spillway discharge water is cascading down the left abutment (in the left part of the photo), seepage water is flowing out of the slough (in the lower center of the photo), and the rock which the Highway Department had dumped into the slough areas from the roadway on the crest of the dam is visible behind the bottom edge of the chain link fence in the photo.

Although bedrock is visible on both sides of the spillway discharge channel downstream of the slough, it is not possible on the basis of the visual inspection alone to determine the depth to bedrock at the location of the slough which is on the centerline of the channel.

Seepage - Seepage problems were apparent at three locations in addition to the seepage associated with the slough at the left end of the dam.

170 At Sta 2+50 seepage of about 50 gallons per minute was discharging from the dry stone masonry wall from the ground surface at the toe up to an elevation about 4 feet above the toe (see Photo A-5B). The seepage water was clear at the time of the inspection. The low level outlet gate at Sta 2+10 was open when this seepage was discharging at the estimated rate of 50 gallons per minute. When the low level outlet gate was closed, the rate of seepage at this location dropped to an estimated 15 gallons per minute.

Another seep, also estimated at 50 gpm, was discharging around the outside of the low level outlet pipe when the low level outlet gate was open (see Photo A-9A). When the gate was shut flow from the seep appeared to diminish somewhat. The seepage water was clear at the time of the inspection.

Between Stations 0+80 and 1+30 there is a soft, wet area which extends 15 to 20 feet downstream from the toe of the dam (see Photo A-6A). Although there was no surface flow or standing water in this area at the time of the inspection, there was evidence that seepage discharge water has flowed over this area in the past. One piece of evidence of such surface flow is an erosion gully about 3 feet deep on top of the slope of the downstream channel adjacent to this area (see Photo A-6B).

There are local accumulations of gray sand and silt at the bottom of the dry stone masonry wall which retains the downstream side of the embankment (see Photo A-7A). There was no seepage discharge at any of these accumulations at the time of the inspection. These accumulations appear to be the result of minor surface erosion of the highway fill on the crest of the embankment, although it is possible that they may be due to piping (internal erosion) of the embankment if seepage water has discharged at any of these locations at times prior to the inspection.

Dry Stone Masonry Wall which Retains Downstream Side of Embankment - The top of the dry stone masonry wall which retains the downstream side of the embankment bulges about 2 feet outward between Stations 0+80 and 1+30 (see Photo A-7B). A birch tree, about 18 inches in diameter, is growing out of the top of the wall at about Sta 1+80, and there are a few smaller trees growing at various locations on the embankment between the top of the wall and the edge of the roadway on the crest of the dam. There are several trees growing at the base of the wall, including one which is about 2 feet in diameter at Station 1+30.

Crest of Dam - There is a shale roadway on the crest of the dam. There is no erosion protection on the crest. It appears that the crest of the dam has been raised about 2 to 3 feet since 1970 (see Photos A-3A and A-3B).

702 Upstream Slope - The upstream slope of the dam is rather irregular, but does not appear to have experienced any sloughing or sliding. The slope is irregularly covered with broken shale and sandstone, most of which has a maximum size of 4 inches and does not appear adequate for erosion protection (see Photo A-3B).

Channel Downstream of Spillway - The flat-lying sandstone and shale which is exposed on the left bank of the channel downstream of the spillway on the left abutment exhibits many open joints and has experienced minor rockfalls.

c. Appurtenant Structures

1) Intake Structure and Gate House

The intake structure is reportedly a vertical 3-foot-diameter pipe riser, about 6 feet high with holes in it and

a trash rack on top, at the upstream end of the outlet pipe. The intake structure was submerged and not observable.

The gate house (see Photo A-8A) is a bare wood structure, 2.5 feet square, on top of a concrete headwall on the upstream slope of the dam. The headwall is in good condition with some minor erosion of the concrete due to water action and weathering. The gate house itself is unpainted, structurally sound, and adequately protects the gate operating mechanism.

Inside the gate house there is a rack gear gate operating mechanism (see Photo A-8B) for operating the gate on the outlet pipe. The mechanism is somewhat rusty, but lubricated and operable. A welded steel box section covers the stem to the gate. The stem is wood where exposed. The condition of remainder of the gate stem and the gate itself could not be determined because they were not visible.

2) Outlet Pipe

The only visible portion of the 18-inch riveted steel outlet pipe was its downstream end (see A-9A). The pipe was rusted, pitted, and the bottom was rusted through at the downstream end. It appears that there is laid-up dry stone masonry surrounding the pipe for part of its length through the dam. There is a void between the pipe and this masonry for about 15 feet from the downstream face of the dam. At the upstream end of this void over the outlet pipe earth that appeared shiney and wet was observed. When the gate on the outlet pipe is open there is a significant amount of flow (discussed under Seepage in Section 3.1b) along the outside of the outlet pipe and inside the dry stone masonry surrounding the pipe.

3) Spillway

The spillway is near the left abutment of the dam (see Photo A-2B). It has 3 metal culverts at its upstream end (one 42-inch, one 30-inch, and one 12-inch, see Photo A-10A). These culverts discharge into a concrete box section through the dam (see Photos A-10B and A-11B). The box culvert discharges into about 10 feet of channel, with a concrete bottom, concrete right training wall, and natural rock left training wall, that empties into a natural rock gorge downstream (see Photo A-4B).

The culvert spillway is in generally poor condition. There is a large vertical crack in the right wall of the box culvert portion of the spillway, about 6 feet from the downstream end. This crack (see Photo A-11A) is 2 inches wide for the full height of the wall. In an inspection done on December 22, 1970 a crack in the wall at this location was noted as being only one inch wide (see Appendix F3-7). There was also a crack across the top of the box

section about 1.5 inches wide that was in line with the crack in the wall. A concrete curb on top of the spillway has a diagonal crack on the same side as the one in the culvert spillway wall.

The base of the right training wall is undermined and eroded (see Photo A-11B). There is severe scaling of the right training wall of the channel section. The paving of the downstream channel is broken up and missing in some places and there is erosion of the concrete at the downstream end of the channel and at its bedrock interface (see Photo A-11B). There is also random efflorescence and scaling of much of the spillway concrete, and cold pour joints in the concrete are visible.

The two riveted steel pipes (42-inch and 12-inch) at the upstream end of the spillway are rusted and the small one is full of dirt at its downstream end. The steel I-beams and plate arches supporting part of the top of the culvert are rusted and there are some holes rusted through the plate arches.

d. Reservoir Area

The reservoir slopes are relatively flat and are no cause for concern about landslides (see Photo A-12A). No evidence of significant sedimentation in the reservoir was observed.

e. Downstream Channel

The spillway discharges into a steep rock gorge (see Photo A-12B). Bear Gulch Brook flows in this gorge which is narrow and encroached by trees.

8955 The outlet pipe discharges into a flat area with some overburden at the toe of the dam. The discharge channel is about a 10-foot-wide grassy area for about 40 feet which then continues over a rock ledge (see Photo A-9B). Flow from the outlet pipe then enters a rock gorge which joins the gorge from the spillway further downstream.

3.2 EVALUATION

Active sloughing of the downstream portion of the embankment near the left abutment, which took place about one week before the inspection, would probably have continued and breached the dam if the level of the pond had not been drawn down. At the time of the inspection, when the pond had been lowered to an elevation about 1 foot below the elevation of the spillway, the embankment material exposed in the slough face was wet and shiney indicating that water was continuing to seep through the embankment and that there is still a possibility of continued sloughing and potential breaching of the dam.

Large seepages, of the order of 50 gallons per minute, which are taking place around the outside of the low level outlet pipe and at a location between the low level outlet and the right end of the dam, could cause piping (internal erosion) of the embankment and consequent breaching of the dam.

Erosion at the downstream edge of a soft, wet area between the low level outlet and the left end of the dam (apparently caused by active seepage and surface flow of water in the past) could eventually reach the downstream toe of the dam and lead to breaching of the dam.

Large trees growing in the dry stone masonry wall which retains the downstream side of the embankment, trees at the downstream toe near the base of this wall, and trees between the top of this wall and the crest of the embankment could lead to seepage and piping problems and consequent breaching of the dam if a tree blows over and pulls out its roots, or if a tree dies and its roots rot.

The lack of erosion protection on the crest of the dam makes it susceptible to erosion by rainfall runoff or by overflowing water if the dam should be overtopped.

75 3 The lack of erosion protection on the upstream slope of the dam in the zone of wave action makes that slope susceptible to erosion.

Deterioration of the flat-lying sandstone and shale on the left side of the downstream channel close to the spillway culvert could result in undermining and structural failure of the culvert.

The spillway could eventually break up with its downstream end falling off into the gorge due to the deteriorated and cracked condition of the concrete. The failure of the spillway could eventually lead to breaching of the dam. The leakage of water through the deteriorated and cracked concrete of the culvert spillway could be detrimental to the embankment as well.

The condition of the stem on the outlet gate and the gate itself should be investigated to determine their condition.

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SECTION 4

OPERATION AND MAINTENANCE PROCEDURES

4.1 OPERATION PROCEDURES

There are no written operation procedures for the dam.

Bear Gulch Pond is presently used for recreational purposes. The water level is normally at or just above the culvert spillway crest and the outlet pipe gate is normally closed. During periods of dry weather the outlet gate is sometimes opened to maintain some flow in Bear Gulch Brook.

At the time of the April 29, 1981 inspection the reservoir level was about one inch higher than the inlet invert of the 42-inch culvert. The outlet pipe was closed at the start of the inspection. At the May 5, 1981 inspection the reservoir level was about one foot lower than the inlet invert of the 42-inch culvert and the outlet pipe was partially open.

4.2 MAINTENANCE OF DAM AND OPERATING FACILITIES

There are no written maintenance procedures for the dam.

The Operator visits the dam randomly, perhaps 5 to 6 times during the summer and less often at other times. The Town Highway Superintendent casually looks at the dam once a week. Since the slough in the downstream face was discovered, the Highway Superintendent has been visiting the dam and checking the water level daily. The Operator has also been visiting the dam more frequently.

The road across the dam is routinely maintained by the Town of Summit Highway Department. No other regular or periodic maintenance of the dam or appurtenances is known to occur.

4.3 EMERGENCY ACTION PLAN AND WARNING SYSTEM

There is no written emergency action plan and warning system for the dam. According to the County Director of Disaster Preparedness, Schoharie County has a standard disaster preparedness plan but it would not be helpful for this dam.

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4.4 EVALUATION

Maintenance of the dam and appurtenances is unsatisfactory. There have been some repairs to the dam in the past. Some of the repairs and modifications recommended in the past, however, have not been carried out. The only routine maintenance at the dam is

concerned with the upkeep of the road across the dam. More effective operation and maintenance procedures, as well as plans for major repairs, need to be developed and implemented in order to avoid the continued deterioration and possible failure of the dam.

The Owner should develop an emergency action plan outlining action to be taken to minimize the downstream effects of an emergency, together with an effective warning system.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 DRAINAGE AREA CHARACTERISTICS

Bear Gulch Pond Dam and Bear Gulch Pond are located on Bear Gulch Brook in central New York. About 3.5 miles downstream of the dam Bear Gulch Brook joins Cobleskill Creek. Cobleskill Creek drains to the east into the Schoharie Creek, which in turn flows north and discharges into the Mohawk River.

The total drainage area at the dam is only 0.74 square miles, of which about 0.07 square miles (45.8 acres), or about nine percent, is actual reservoir surface at the spillway crest (see Appendix C-6). The topography of the drainage area is characterized by slopes of from 10% to 15%. Elevations in the drainage area vary from EL 2110 to EL 2435.

5.2 ANALYSIS CRITERIA

The U.S. Army Corps of Engineers Hydrologic Engineering Center's Program HEC-1 DB (Reference 3) was used to develop the test flood hydrology and perform the reservoir routing.

The purpose of this analysis was to evaluate the dam and spillway with respect to their surcharge storage and spillway capacity. Accordingly, it was assumed that the water surface was at the invert of the 42-inch spillway culvert, EL 2110, at the start of the flood routing. In addition, the outlet pipe was assumed closed, as it is normally.

A constant base flow of 2 cfs per square mile was chosen to represent average conditions in the drainage area and was inputted into the program for all subareas.

The index PMP (probable maximum precipitation) inputted to the HEC-1 DB program was 19.5 inches for a 24-hour duration, all-season storm over a 200-square-mile basin, according to HMR 33 (Reference 4). Maximum 6-hour, 12-hour, 24-hour, and 48-hour precipitation for the actual size of the drainage area (same for 10 square miles or less) were inputted to the program as percentages of the index PMP in accordance with HMR 33. A storm reduction coefficient was then applied internally by the program in order to transpose or center the storm over the actual total drainage area. Thus, the corrected 48-hour PMP for the actual total drainage area became 22.2 inches. All rainfall was distributed using the Standard Project Storm arrangement embedded in the program.

Appendix C-7 summarizes the subarea, loss rate, and unit hydrograph data inputted to the program. Only two subareas were used. Subarea 1 consists of all the drainage area around the

reservoir, and Subarea 2 consists of just the reservoir surface. For the land in Subarea 1, loss rates were assumed to be 1.0 inch initially and a constant 0.1 inch per hour thereafter. A Snyder unit hydrograph basin coefficient was assumed for average conditions and a Snyder peaking coefficient was chosen from the 1976 Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models (Reference 20). A conservative standard lag time was computed. The program uses the inputted lag time and Snyder peaking coefficient to solve by iteration for approximate Clark coefficients which are then used to calculate the runoff hydrograph.

For the reservoir surface making up Subarea 2, loss rates were set to zero so that rainfall would equal rainfall excess, or runoff. Assuming no delay in the rainfall/runoff response, a constant unit hydrograph for a rainfall duration equal to the HEC-1 DB calculation interval was developed per Appendix C-7 and inputted to the program.

The floods selected for analysis were the PMF (probable maximum flood) and 1/2 PMF. Floods as ratios of the PMF (e.g., 1/2 PMF) were taken as ratios of runoff, not of precipitation. Peak inflow for the PMF is about 2,440 cfs, or 3,297 csm (cfs per square mile). Peak outflow is reduced by reservoir routing to about 2,190 cfs (2,959 csm). For 1/2 PMF the peak inflow is about 1,220 cfs (1,649 csm) and the routed peak outflow is about 740 cfs (1,000 csm).

5.3 RESERVOIR CAPACITY

Storage capacity data for the reservoir was developed using USGS contour mapping (see Appendix C-5) and a sketch with reservoir depths obtained from the NYS-DEC, Division of Fish and Wildlife (see Appendix F3-5). Reservoir area at the spillway crest was assumed to be the area shown on Schoharie County tax mapping. Area measurement inside one contour elevation above the spillway crest was obtained from USGS mapping. A reservoir area of zero was assumed for the bottom of the pond, and the capacity of the reservoir at various elevations was then computed by the HEC-1 DB program using the method of conic sections. The inputted elevation - area data and a hand tabulation of the volumes is on Appendix C-6.

At the spillway crest, EL 2110, (assumed to be the inlet invert of the 42-inch spillway culvert), the reservoir has a capacity of 214 acre-feet. At the top of dam, EL 2113.5, the reservoir has a capacity of 391 acre-feet. Surcharge storage between the spillway crest and top of dam amounts to 177 acre-feet, or about 4.5 inches of runoff from the total 0.74-square-mile drainage area. Therefore, the reservoir has some capacity to attenuate peak inflow.

5.4 SPILLWAY CAPACITY

The dam has about a 30-foot-long culvert spillway that starts with 3 short culvert pipes on the upstream side of the dam. A 42-inch

riveted steel pipe, inlet invert at EL 2110.0; a 30-inch corrugated metal pipe, inlet invert at EL 2109.9; and a 12-inch riveted steel pipe, inlet invert at EL 2110.7, all about 10 feet long, discharge into about a 6-foot-wide by 5-foot-high concrete box section through the dam.

The discharge capacity for the spillway was taken to be the sum of the capacities of each of the upstream culverts. The culvert capacities were liberally calculated assuming orifice flow. The spillway discharge computations are presented on Appendix C-8. With water 3.5 feet over the invert of the 42-inch culvert (water level at top of dam) the spillway discharges about 103 cfs.

For the spillway crest at EL 2110 and the top of dam at EL 2113.5, total discharge computations are summarized on Appendix C-9. Total discharge from the dam is the sum of the discharge from the culvert spillway, plus flow over the dam for the overtopping condition. As discussed previously in Section 5.2, the capacity of the outlet pipe was neglected since it is normally closed. The hand-computed discharges for the spillway were inputted directly to the HEC-1 DB program.

With the reservoir level at the top of dam, EL 2113.5, the total discharge from the dam is just the capacity of the culvert spillway, or about 103 cfs.

5.5 FLOODS OF RECORD

There are no known records of past flood discharges at the dam.

5.6 OVERTOPPING POTENTIAL

The results of the overtopping analysis using the HEC-1 DB program are summarized in Table 5.1. The overtopping analysis computer input and output for the PMF and 1/2 PMF are included starting on Appendix C-10.

As noted from Table 5.1, the PMF overtops the dam by about 1.6 feet maximum with duration of overtopping of about 7 hours. 1/2 PMF also overtops the dam but only by about 0.7 of a foot maximum with duration of overtopping of about 4.8 hours. Peak inflows are 2,440 cfs for the PMF and 1,220 cfs for 1/2 PMF. Peak outflows are reduced by reservoir routing to 2,190 cfs for the PMF and 740 cfs for 1/2 PMF. Time to maximum stage, or the time from the start of the 48-hour storm to peak outflow, is about 41 hours for both PMF and 1/2 PMF. The peak portion of the inflow and outflow hydrographs for the PMF and 1/2 PMF are shown by the computer plots on Appendices C-16 and C-17. Total project discharge capacity at the top of dam is due only to the culvert spillway (outlet pipe closed) and is about 103 cfs, or only about 5% of the PMF peak outflow and about 14% of the 1/2 PMF peak outflow.

TABLE 5.1

BEAR GULCH POND DAM

OVERTOPPING ANALYSIS

CONDITIONS

Total Drainage Area = 0.74 Square Miles
Start Routing at Spillway Crest EL 2110
Top of Dam EL 2113.5
Total Project Discharge Capacity at Top of Dam = 103 cfs ± due to culvert spillway. Outlet pipe assumed closed.
Some values rounded from computed results.

	PMF	1/2 PMF [a]
INFLOW		
48-hour Rainfall (inches)	22.2	13.0 [b]
48-hour Rainfall Excess (inches) [c]	18.5	9.3 [d]
Peak Inflow (cfs)	2,440	1,220
Peak Inflow (csm)	3,297	1,649
OUTFLOW		
Peak Outflow (cfs)	2,190	740
Peak Outflow (csm)	2,959	1,000
Time to Peak Outflow (hours)	40.8	41.5
Maximum Storage (acre-feet)	486	433
Max. W.S. Elevation (feet-NGVD)	2115.1	2114.2
Minimum Freeboard (feet)	overtopped	overtopped
Maximum Depth over Dam (feet)	1.6	0.7
Duration of Overtopping (hours)	7.0	4.8

(a) One-half of PMF total runoff, including base flow. For PMF base flow = 2 cfs per square mile = 1.5 cfs ±.
(b) Approximation assuming total losses are the same as for the PMF.
(c) Rainfall Excess = Rainfall for the Reservoir Surface. For the rest of the drainage area, losses are assumed to be 1.0 inch initially and 0.1 inch per hour thereafter.
(d) Equal to one-half of PMF value.
(e) If outlet pipe is full open and routing starts with reservoir empty, total discharge capacity at top of dam = 138 cfs ± ; for PMF, peak outflow = 1,460 cfs ± and dam overtopped by 1.2 feet; for 1/2 PMF, peak outflow = 85 cfs ± and minimum freeboard is 1.4 feet.

The effect of the outlet pipe and of total reservoir storage on overtopping potential was also investigated. The lake was modeled starting completely empty and with the outlet pipe fully open. For this case the total discharge capacity at top of dam is due to the culvert spillway and the outlet pipe, and is about 138 cfs, or only about 9% of the PMF peak outflow. The PMF overtops the dam by about 1.2 feet, whereas 1/2 PMF does not overtop the dam but results in about 1.4 feet of freeboard. The computer input and output are not included in this report, but the results are summarized by footnote (e) on Table 5.1.

5.7 EVALUATION

Maximum spillway discharge capacity (outlet pipe closed) is only about 5% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. It is judged that failure due to overtopping would significantly increase the hazard to loss of life downstream from that which would exist just prior to failure. Therefore, in accordance with Corps of Engineers' screening criteria for review of spillway adequacy, spillway capacity is considered "seriously inadequate".

SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

The following visual observations, which are discussed in detail in Section 3 of this report, are indicative of problems that adversely affect the structural stability of Bear Gulch Pond Dam.

1) A major slough on the downstream side of the embankment near the left abutment.

2) Seepage of about 50 gpm at a location between the outlet pipe and the right abutment.

3) Seepage of about 50 gpm around the outside of the outlet pipe.

4) Erosion at the downstream edge of a soft, wet area near the toe of the dam where there appears to have been active seepage discharge and consequent surface flow in the past.

5) Trees growing out of the dry stone masonry wall which retains the downstream side of the embankment, trees growing at the downstream toe next to this wall, and trees growing between the top of this wall and the crest of the embankment.

6) A bulge of about 1 to 2 feet downstream in the horizontal alignment of the dry stone masonry wall which retains the downstream side of the embankment.

7) Lack of erosion protection on the crest of the dam.

8) Lack of erosion protection on the upstream slope of the embankment in the zone of wave action.

9) Deterioration of the rock on the left bank of the downstream channel near the spillway discharge culvert.

b. Design and Construction Data

No design or construction data are available for this dam.

c. Operating Records

A letter dated February 3, 1970 from the New York State Water Resources Commission to Mr. Maynard Tillapaugh (see Appendix F3-13) indicates that at the time of an inspection on January 29, 1970 "settlement and sliding of earth materials forming the upstream slope of the dam and shoulder of the road was occurring which, if allowed to continue, might imperil the stability of the structure." There is no further mention of this problem in the records available for the present inspection.

d. Post-Construction Changes

Some rehabilitation work was performed in 1970. It appears to have included raising the crest of the dam to a uniform elevation which was about 2 feet higher than the low point on the crest prior to the rehabilitation. The type of material used to raise the crest is not described in any of the records available for the present inspection. In 1980 the Town Highway Department raised the crest and roadway about 8 inches with shale.

An early newspaper clipping (believed to date from about 1930, see Appendix F3-4) states that "the head of the dam until recently had been allowed to fall in decay... and repairs have been made." No further information about the condition of the dam at that time or the nature of the repairs is given in the records available for the present inspection.

e. Seismic Stability

This dam is in Seismic Zone 1. According to Recommended Guidelines (Reference 1) a seismic stability analysis is not required.

6.2 STABILITY ANALYSIS

A structural stability analysis is not required because there are no gravity structures at this dam to analyze.

SECTION 7

ASSESSMENT AND RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Examination of available documents and visual inspection of Bear Gulch Pond Dam revealed conditions which constitute an immediate hazard to human life and property. The dam is assessed as "unsafe, emergency" for the following reasons:

1) A major, active slough on the downstream side of the embankment near the left abutment, which gives reason to conclude that the dam is in imminent danger of failure.

2) Large seepages, of about 50 gallons per minute each, which are taking place at a location between the outlet pipe and the right abutment, and from around the outside of the outlet pipe itself.

3) Spillway capacity which is considered "seriously inadequate" in accordance with Corps of Engineers' screening criteria for review of spillway adequacy. Hydrologic and hydraulic analysis indicates that maximum spillway discharge capacity is only about 5% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. It is judged that failure due to overtopping would significantly increase the hazard to loss of life downstream from that which would exist just prior to failure.

Visual inspection of the dam revealed the following additional deficiencies which also affect the safety of the dam:

1) Erosion at the downstream edge of a soft, wet area near the toe of the dam where there appears to have been active seepage discharge and consequent surface flow in the past.

2) Trees growing out of the dry stone masonry wall which retains the downstream side of the embankment, trees growing at the downstream toe next to this wall, and trees growing between the top of this wall and the crest of the embankment.

3) A bulge of about 1 to 2 feet downstream in the horizontal alignment of the dry stone masonry wall which retains the downstream side of the embankment.

4) Large structural cracks in the concrete of the right wall and top of the spillway culvert.

5) Other lesser deficiencies revealed during the visual inspection which also affect the safety of the dam.

b. Adequacy of Information

Available information together with that gathered during the visual inspection is considered adequate for this Phase I Inspection.

c. Need for Additional Investigations

The following detailed engineering investigations should be performed by a registered professional engineer qualified by training and experience in the design of dams:

Start Within 1 Month

1) Investigate the causes of the slough near the left end of the dam.

2) Investigate the causes of the seepage between the outlet pipe and the right abutment, the seepage along the outside of the outlet pipe, and the soft, wet area at the downstream toe of the dam between the outlet pipe and the left abutment.

3) Perform a detailed hydrologic and hydraulic analysis to better assess spillway capacity. This should include a more accurate determination of the site specific characteristics of the watershed.

Also, given the fact that the pond is drained as recommended in Section 7.2a, a failure analysis should first be performed to evaluate the consequences to the downstream area if the pond is filled, voluntarily or involuntarily to any level above the outlet pipe. A preliminary hydrologic and hydraulic analysis should be done to evaluate the extent to which the pond may fill involuntarily during heavy rainfall. An extension of the analysis done as part of this report indicates that starting with the pond empty and the outlet pipe fully open, 1/2 PMF would not overtop the dam but would crest about 1.4 feet below the top or about 2.1 feet above the spillway crest. The PMF would overtop the dam by about 1.2 feet.

Based on the failure analysis and the preliminary hydrologic and hydraulic analysis, the Engineer should recommend whether the dam should be breached until permanent repairs can be made.

Start Within 6 Months

1) Investigate the deterioration of the rock in the left abutment immediately downstream of the spillway culvert.

2) Investigate the causes of the bulging of the dry stone masonry wall which retains the downstream side of the embankment.

3) Investigate the cause of the large structural cracks in the concrete of the right wall and top of the spillway culvert.

4) When the pond is drained, investigate the condition of the outlet pipe, sluice gate, and gate stem.

The results of all the investigations will determine the type and extent of remedial work required to restore the safety of the dam.

d. Urgency

As recommended below in Section 7.2a, the pond should be drained immediately. While this is progressing, and within 1 month after receipt of this report by the Owner, the first 3 investigations recommended in Section 7.1c should be started. This includes the failure analysis and preliminary hydrologic and hydraulic analysis to determine whether the dam should be breached until permanent repairs can be made. The remainder of the investigations recommended in Section 7.1c should be started within 6 months after receipt of this report by the Owner.

Any remedial work deemed necessary as a result of all these investigations should be completed within 18 months after receipt of this report by the Owner.

As a result of the visual inspection on May 5, 1981, a telegram recommending that the pond be drained immediately was sent to the Governor and the Owner on May 8, 1981 (see copy Appendix F3-19). By letter dated May 12, 1981 the NYS Department of Environmental Conservation ordered the Owner to immediately drain the pond by opening the outlet pipe. On May 14, 1981 the Owner partially opened the outlet pipe and started draining the pond. Newspaper clippings concerning the draining are included starting on Appendix F3-21. Reportedly, the pond is presently being drained, but progress has been slow.

Measures recommended below in Section 7.2b should be completed within 12 months after receipt of this report by the Owner.

7.2 RECOMMENDED MEASURES

The following work should be performed by the Owner. Where engineering assistance is indicated, the Owner should engage a registered professional engineer qualified by training and experience in the design of dams. Assistance by such an engineer may also be useful for some of the other work.

a. Complete Immediately

Drain the pond to the level of the outlet pipe and keep the outlet pipe fully open pending the results of the additional investigations recommended in Section 7.1c.

b. Complete Within 12 Months

1) Repair the erosion that has occurred at the downstream edge of the soft, wet area near the toe of the dam between the outlet pipe and the left abutment in accordance with design and field observation of the work by an engineer.

2) Remove trees and their root systems from a zone 25 feet wide next to the downstream toe of the dam, from the dry stone masonry wall which retains the downstream side of the embankment, and from the embankment between the top of the masonry wall and the crest of the dam, all in accordance with specifications and field observation of the work by an engineer. Continue to keep these same areas clear by cutting, mowing, and cleanup at least annually.

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3) Construct erosion protection for the crest of the dam and for the upstream slope in the zone of wave action in accordance with design and field observation of the work by an engineer.

4) Develop and implement effective routine operation and maintenance procedures. The outlet gate should be exercised regularly. The Owner should visually inspect - not just casually look at - the dam and appurtenant structures at least once a month.

5) Institute a program of comprehensive technical inspection of the dam and appurtenances by an engineer on a periodic basis of at least once every two years.

6) Develop a surveillance program for use during and immediately after heavy rainfall or snowmelt. Also develop an emergency action plan outlining action to be taken to minimize the downstream effects of an emergency, together with an effective warning system.

c. Complete Within 18 Months

The following remedial work should be completed by the Owner. A qualified, registered professional engineer should design and observe the construction of the remedial work.

1) Appropriate modifications as a result of investigating the causes of the slough near the left end of the dam.

2) Appropriate modifications as a result of investigating the causes of the seepage between the outlet pipe and the right abutment, the seepage along the outside of the outlet pipe, and the soft, wet area at the downstream toe of the dam between the outlet pipe and the left abutment.

3) Appropriate modifications as a result of the detailed hydrologic and hydraulic analysis.

4) Appropriate modifications as a result of investigating the deterioration of the rock in the left abutment immediately downstream of the spillway culvert.

5) Appropriate modifications as a result of investigating the causes of the bulging of the dry stone masonry wall which retains the downstream side of the embankment.

6) Appropriate modifications as a result of investigating the cause of the large structural cracks in the concrete of the right wall and top of the spillway culvert.

7) Appropriate modifications as a result of investigating the condition of the outlet pipe, sluice gate, and gate stem when the pond is drained.

APPENDIX A

PHOTOGRAPHS

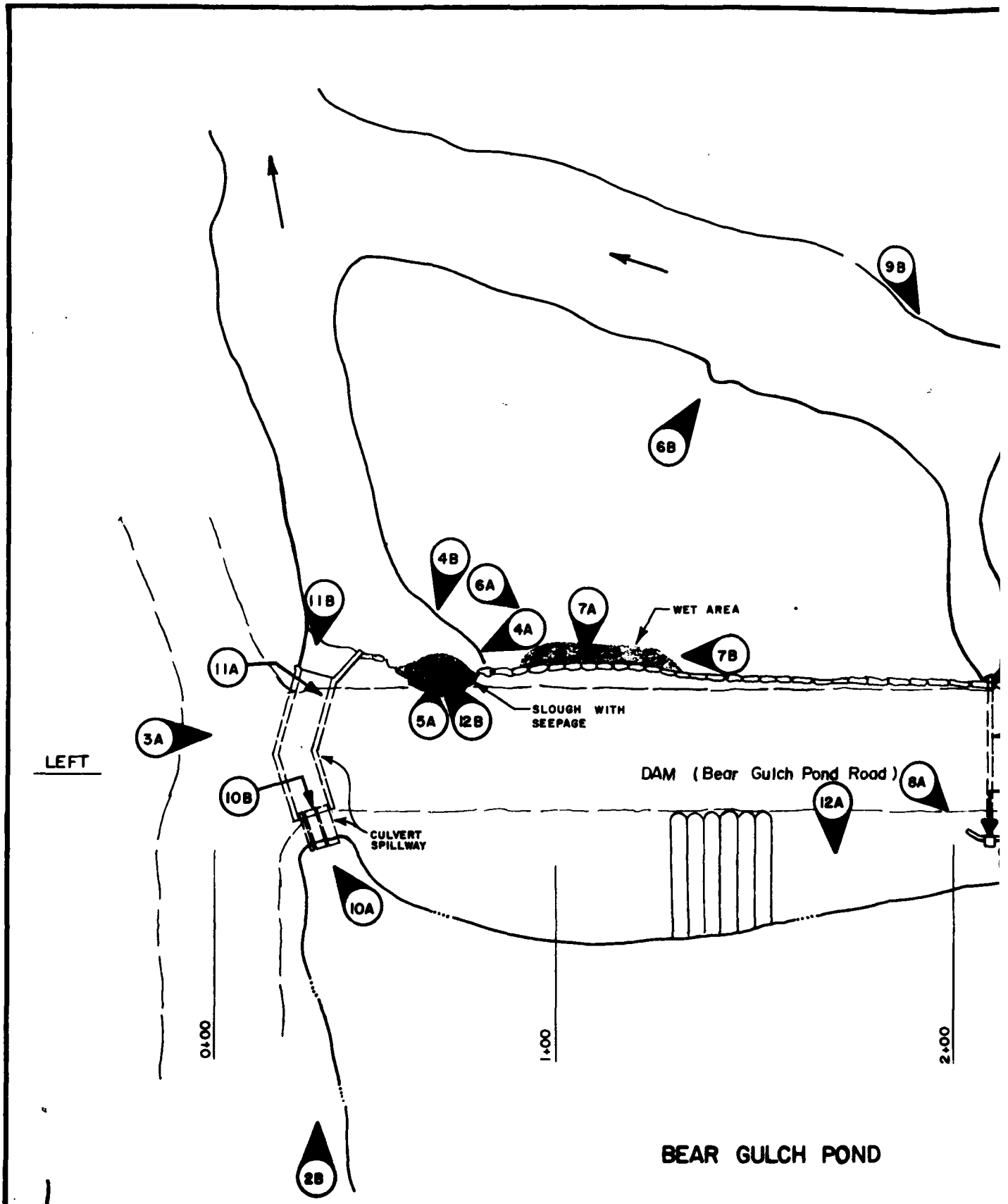
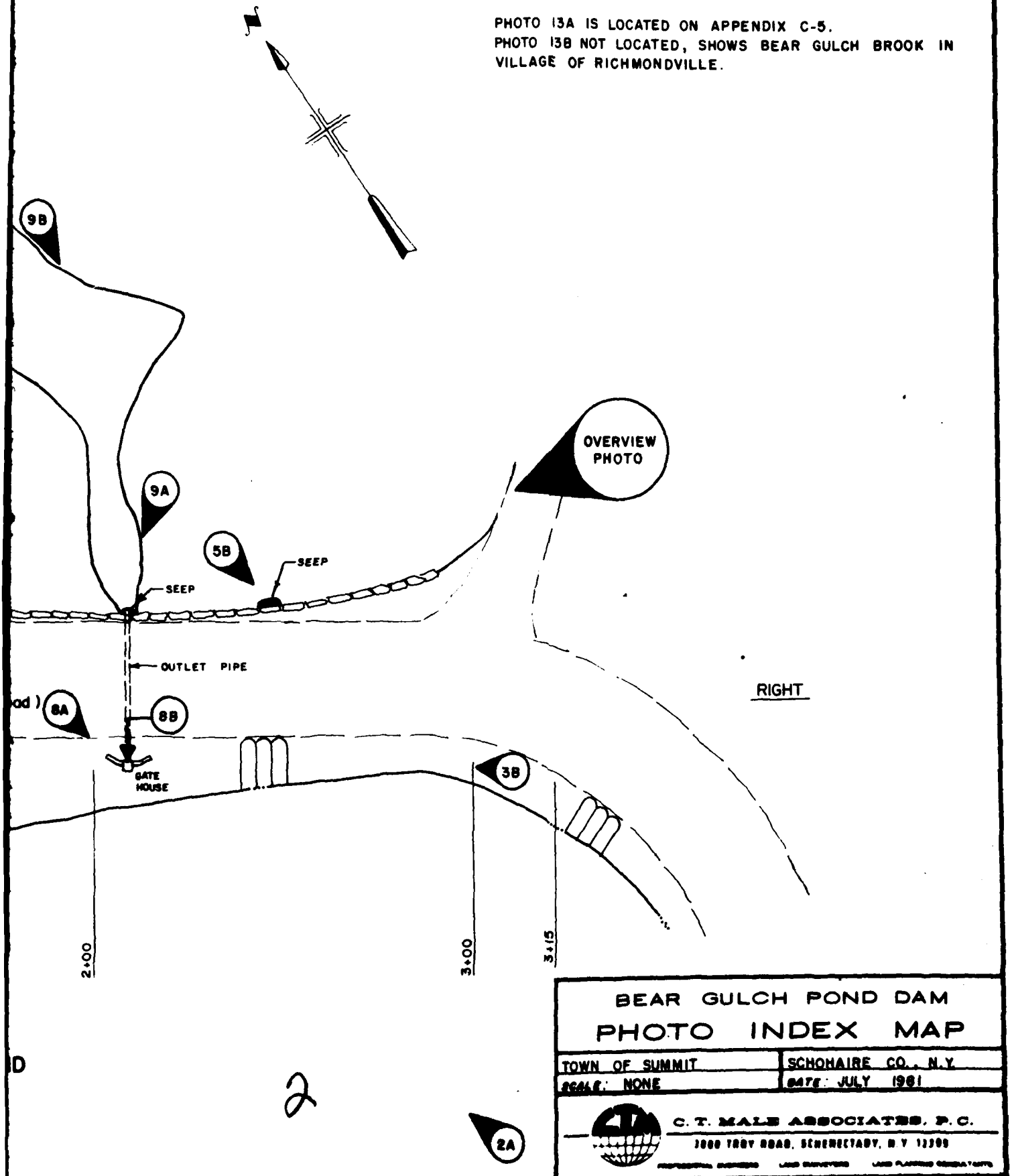

9B
6B
4B
6A
4A
7A
WET AREA
7B
11B
11A
5A
12B
SLOUGH WITH SEEPAGE
3A
LEFT
10B
DAM (Bear Gulch Pond Road)
8A
12A
CULVERT SPILLWAY
10A
0+00
1+00
2+00
2B
BEAR GULCH POND

PHOTO 13A IS LOCATED ON APPENDIX C-5.
PHOTO 13B NOT LOCATED, SHOWS BEAR GULCH BROOK IN VILLAGE OF RICHMONDVILLE.



BEAR GULCH POND DAM
PHOTO INDEX MAP

TOWN OF SUMMIT	SCHOHARIE CO., N.Y.
SCALE: NONE	DATE: JULY 1981

C.T. MALE ASSOCIATES, P.C.
50 TROY ROAD, SCHENECTADY, N.Y. 12306
PROFESSIONAL ENGINEERS LAND SURVEYORS LAND PLANNING CONSULTANTS

PROJECT NO. 58-01-00015/80.855

A-1

DWG. NO. 81-26

A-2A Upstream slope of dam looking from upstream of right abutment 5/5/81

A-2B Upstream slope of dam with culvert spillway, looking from upstream of left abutment. Piles of dirt on roadway are to keep vehicles from driving into washout area at downstream crestline - 5/5/81

A-3A Top of dam looking from left abutment - 5/5/81

A-3B Upstream slope of dam looking from right abutment - 5/5/81

A-4A Top of washout area looking toward left abutment - 5/5/81

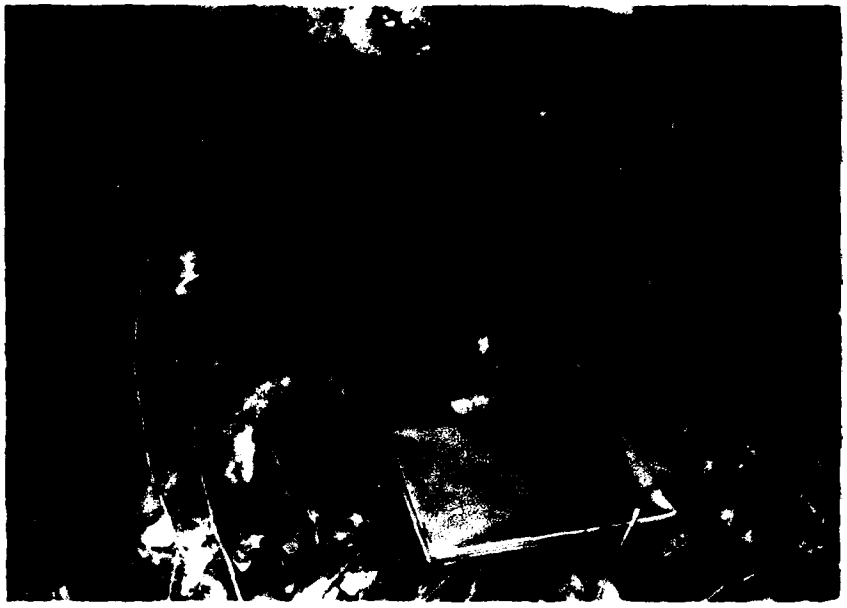
A-4B Washout area and downstream end of culvert spillway - 4/29/81

A-5A Washout area looking from top of dam. Note seepage in foreground from washout area - 4/29/81

A-5B Seep in downstream dry stone masonry wall at Sta 2 + 50 5/5/81

A-6A Soft, wet area at downstream toe between Sta 0 + 80 and Sta 1 + 30. Wet area is at EL 2103.6 - 5/5/81

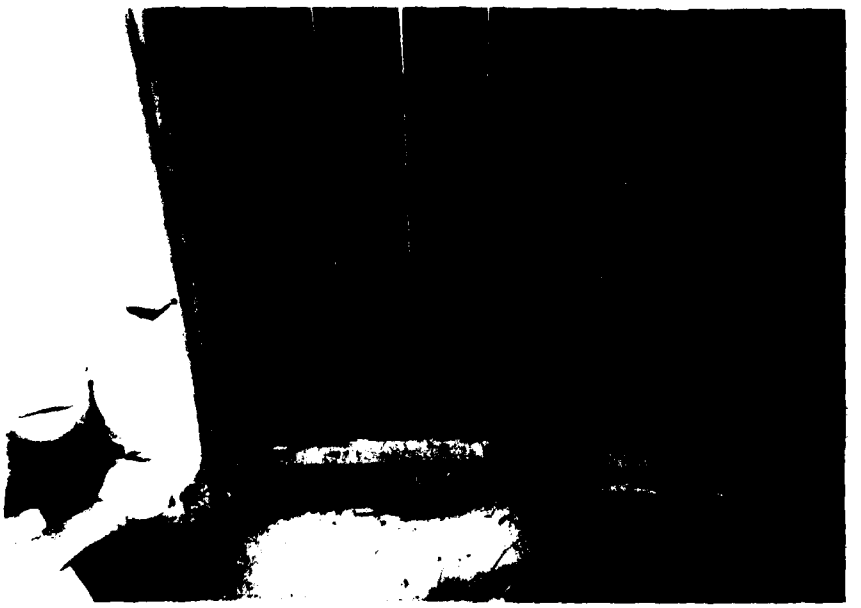
A-6B Major erosion of natural soil at Sta 1 + 40 about 30 feet downstream of dam, caused by seepage flow - 5/5/81



A-7A Silt washed out at toe of dam at Sta 1 + 20 - 5/5/81

A-7B Bulge of about 2 feet in alignment of top of dry stone masonry wall at downstream side of dam - 5/5/81

A-8A Headwall with gate house - 5/5/81

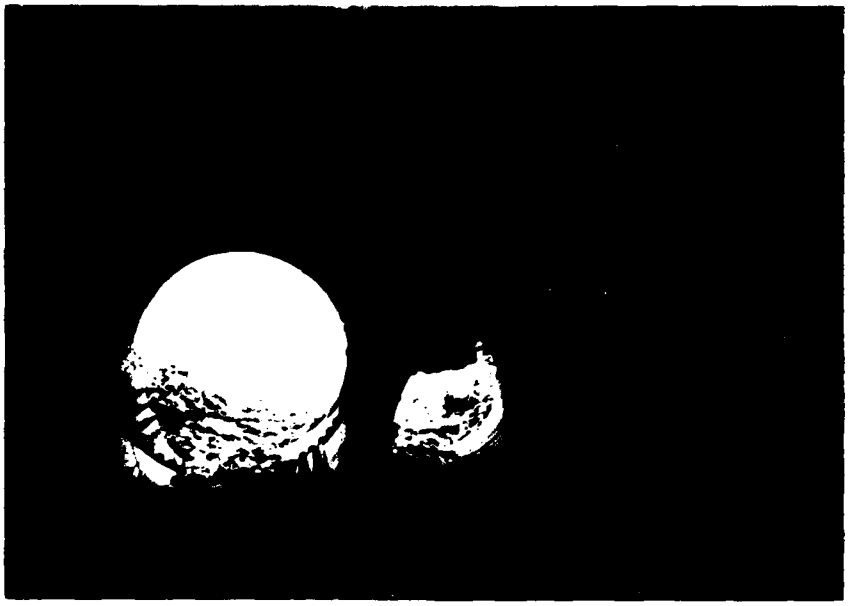


A-8B Rack gear gate operating mechanism - 5/5/81

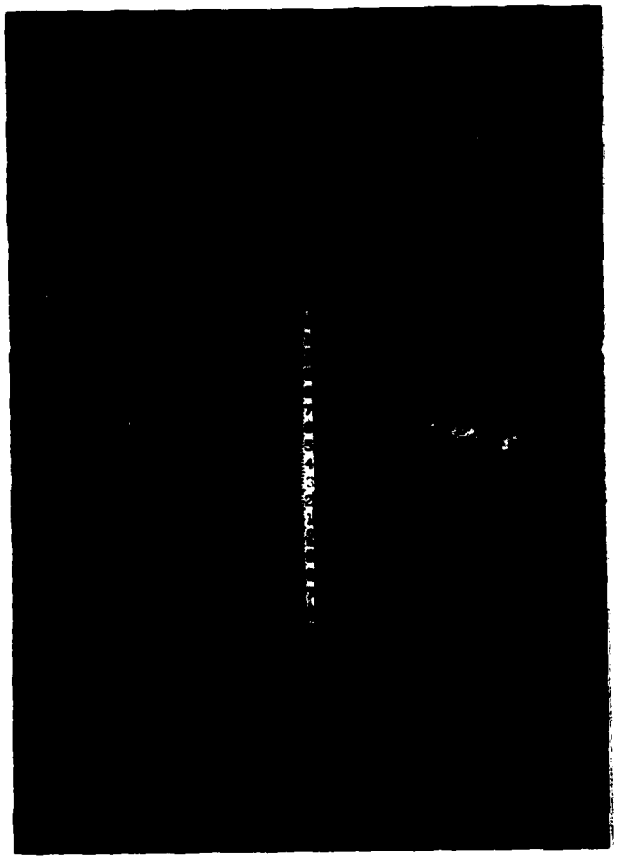
A-9A Outlet pipe at downstream end - 5/5/81

A-9B Outlet pipe discharge channel from downstream. Flow at left in photo is seepage and flow at right is from outlet pipe 5/5/81

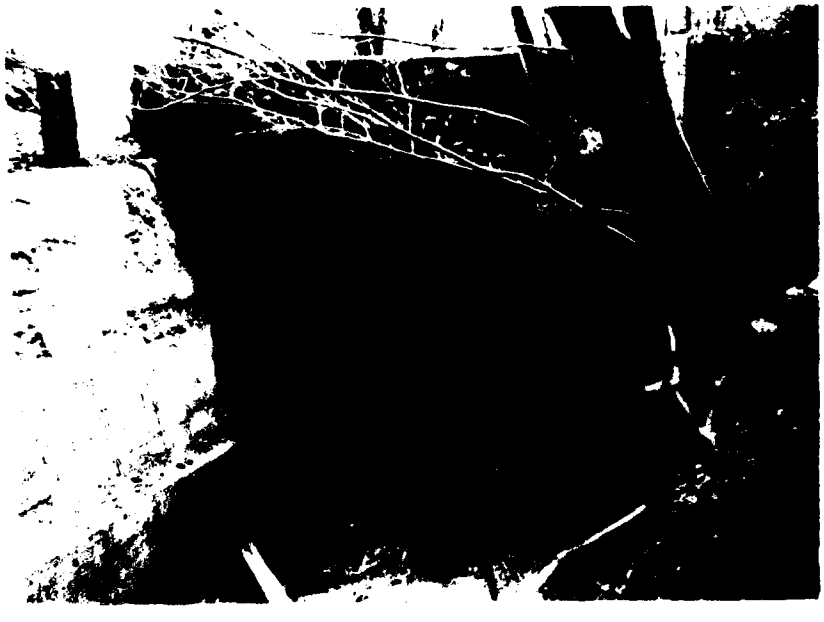
A-10A Culvert pipes at upstream end of culvert spillway - 5/5/81



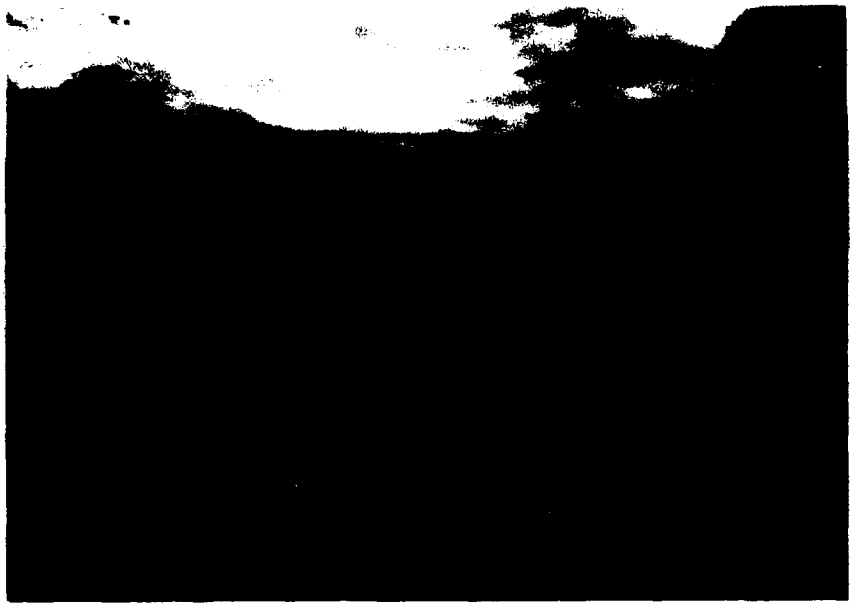
A-10B Culvert pipes looking upstream from inside box culvert spillway 5/5/81



A-11A Structural crack in right wall of box culvert 6 feet from downstream end - 5/5/81

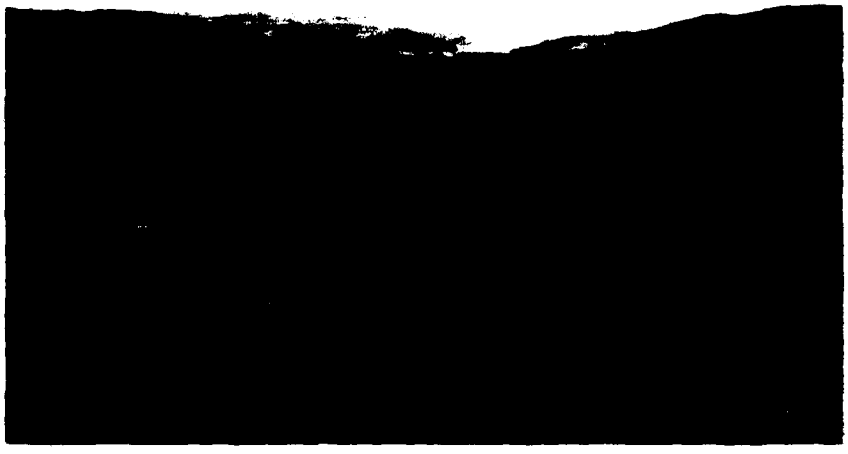


A-11B Downstream end of culvert spillway looking upstream - 5/5/81



A-12A Bear Gulch Pond looking upstream from top of dam - 5/5/81

A-12B Bear Gulch Brook looking downstream from top of washout area at downstream crestline - 5/5/81



A-13A Downstream hazard area about 2000 feet from dam, looking downstream - 5/5/81

A-13B Bear Gulch Brook in Richmondville, about 3 miles from dam, looking downstream - 4/29/81

APPENDIX B

VISUAL INSPECTION CHECKLIST

PHASE I

VISUAL INSPECTION CHECKLIST

1. BASIC DATA

a. General

Name of Dam Bear Gulch Pond Dam

Fed. I.D.# NY01089 DEC Dam No. 154 D-474

River Basin MOHAWK RIVER

Location: Town SUMMIT County SCHOHARIE

Stream Name BEAR GULCH BROOK

Tributary of COBLESKILL CREEK

Latitude (N) 42° 35.9' Longitude (W) 74° 35.6'

Type of Dam EARTH W/ DRY STONE MASONRY WALL @ D/S FACE

Hazard Classification HIGH

Date(s) of Inspection May 5, 1981 APRIL 29, 1981

Weather Conditions 5/5/81 - PARTLY CLOUDY, WARM
4/29/81 - COOL, W/ RAIN AT TIMES

Reservoir Level at Time of Inspection 5/5/81 EL 2109 ±
4/29/81 EL 2110.1 ±

b. Inspection Personnel(1) (*Recorder) THOMAS BENEDUM - CTM,
EDWIN VOPELAK JR.* - CTM, RONALD C. HIRSCHFELD - GEI*

(1) ALL PERSONNEL WENT ON 5/5/81 INSPECTION, ONLY VOPELAK ON 4/29/81 INSPECTION W/ G. KOCH & K. HARMER OF NYS-DEC

c. Persons Contacted (Including Title, Address & Phone No.)

MAYNARD TILLAPAUGH, OWNER (SEE BELOW) H (518) 234-2952 O (518) 294-7252

LARRY DIBBLE, HIGHWAY SUPT., TOWN OF SUMMIT H (518) 287-1379 O (518) 287-1544

EDWIN DIMMLER*, SUPERVISOR, TOWN OF SUMMIT H (518) 287-1550

KEVIN P. NEARY, DIRECTOR, SCHOHARIE COUNTY OFFICE OF DISASTER PREPAREDNESS, SPRING ST., SCHOHARIE NY 12157 (518) 295-7244

* ONLY AT 5/5/81 INSPECTION

d. History

Date Constructed EARLY 1900's Date(s) Reconstructed N/A

Designer UNKNOWN

Constructed By UNKNOWN

Owner RICHMONDVILLE WATER COMPANY, ATTN: MAYNARD TILLAPAUGH, 98 N. GRAND ST., COBLESKILL, N.Y. 12043 (518) 234-2952

1568 Name of Dam Bear Gulch Pond Dam Date May 5, 1981 2

2. EMBANKMENT

a. Characteristics

GEI 1) Embankment Material Unknown

GEI 2) Cutoff Type Unknown

GEI 3) Impervious Core Unknown

GEI 4) Internal Drainage System Unknown

GEI 5) Miscellaneous No comments

GEI b. Crest

GEI 1) Vertical Alignment Good

GEI 2) Horizontal Alignment Vertical dry-stone-masonry wall which supports downstream side of embankment bulges about 1 to 2 feet between Stations 0+80 and 1+30

GEI 3) Lateral Movement See comment under 2.b.2)

GEI 4) Surface Cracks None observed

GEI 5) Miscellaneous No comments

GEI c. Upstream Slope

GEI 1) Slope (Estimate H:V) 3H : 1V (average)

GEI 2) Undesirable Growth or Debris, Animal Burrows None observed

GEI 3) Sloughing, Subsidence or Depressions None observed, but slope is quite irregular

GEI 4) Slope Protection Slope is irregularly covered with broken shale and sandstone less than 4 inches in size.

GEI 5) Surface Cracks or Movement at Toe None observed

GEI d. Downstream Slope

GEI 1) Slope (Estimate - H:V) Vertical

GEI 2) Undesirable Growth or Debris, Animal Burrows Large tree growing out of dry-stone-masonry wall at Station 1+60. Several trees growing on crest next to wall and at downstream toe next to wall.

GEI 3) Sloughing, Subsidence or Depressions Major sloughing of downstream side of embankment between Stations 0+25 and 0+70 next to spillway culvert at left abutment.

GEI 4) Surface Cracks or Movement at Toe None observed.

GEI 5) Seepage Seepage of about 50 gpm at Station 2+50.

GEI 6) External Drainage System (Ditches, Trenches, Blanket) None observed

GEI 7) Condition Around Outlet Structure Seepage of about 50 gpm along outside of low-level-outlet pipe.

GEI 8) Seepage Beyond Toe Large soft, wet area beyond toe between Stations 0+80 and 1+30. Evidence of water having flowed from this area in the past but no surface flow or standing water at time of inspection.

GEI e. Abutments - Embankment Contact

Right abutment in good condition. Sloughing of embankment next to spillway culvert at left abutment (see 2.d.2) above). Bedrock exposed on left abutment immediately downstream of spillway has many open joints and has experienced minor rockfalls.

4586 Name of Dam Bear Gulch Pond Dam Date May 5, 1981 4

GEI 1) Erosion at Contact see Comments 2.d.3) and 2.e. above.

GEI 2) Seepage Along Contact Face of embankment exposed in slough was wet at time of inspection. Water is reported to have been actively seeping from slough several days earlier before pond was lowered.

3. DRAINAGE SYSTEM

GEI a. Description of System None observed.

GEI b. Condition of System Not applicable.

GEI c. Discharge from Drainage System Not applicable.

4. INSTRUMENTATION (Monumentation/Surveys, Observation Wells, GEI Weirs, Piezometers, Etc.)

None observed.

5. RESERVOIR

GEI a. Slopes Gentle slopes. Camps on shoreline of pond.

GEI b. Sedimentation No evidence of significant sedimentation observed.

GEI c. Unusual Conditions Which Affect Dam None observed

1285 Name of Dam Bear Gulch Pond Dam Date May 5, 1981 5

6. AREA DOWNSTREAM OF DAM

a. Downstream Hazard (No. of Homes, Highways, etc.) SEVERAL DWELLINGS LOCATED BETWEEN 1300' TO 6600' D/S OF THE DAM AFTER A VERTICAL DROP OF UP TO 700'. VILLAGE OF RICHMONDVILLE LOCATED 3 MILES D/S AFTER A VERTICAL DROP OF 1000' FROM THE DAM.

GEI b. Seepage, Growth Trees overhang channel.

GEI c. Evidence of Movement Beyond Toe of Dam Soil from slough at left end of dam has moved down the steep discharge channel beyond the toe of the dam.

d. Condition of Downstream Channel STEEP NARROW ROCK GORGE W/ TREE + BRUSH ENCROACHMENT.

7. SPILLWAY(S) (Including Discharge Channel)

a. General 3 CULVERTS @ U/S SIDE OF DAM - ONE 42" RIVETED STEEL, ONE 30" CMP, ONE 12" RIVETED STEEL. CULVERTS ABOUT 10'± LONG + ENTER CONCRETE BOX CULVERT, 6'x5' THROUGH DAM. BOX CULVERT HAS CONCRETE SIDE WALLS AND CONCRETE ROOF. PART OF TOP HAS I BEAM AND PLATE ARCHES FOR SUPPORT. ROADWAY ON DAM CREST CROSSES OVER SPILLWAY, BOX CULVERT HAS BEND POINT IN MIDDLE.

b. Conditon of Service Spillway - GENERALLY POOR, VERTICAL CRACK IN THE RIGHT WALL OF SPILLWAY ABOUT 6' FROM END. CRACK 2" WIDE FOR FULL HEIGHT OF WALL. CRACK ACROSS TOP OF BOX SECTION 1.5" WIDE, IN LINE W/ CRACK IN WALL. CONCRETE ALONG BASE OF THE RIGHT WALL IS UNDERMINED + ERODED. CONCRETE PAVING OF CHANNEL BROKEN UP + MISSING IN SOME PLACES. EROSION AT D/S END OF CHANNEL + BEDROCK INTERFACE. DIAGONAL CRACK IN CONCRETE CURBING ABOVE SPILLWAY, RIGHT SIDE. DEEP SCALING OF RIGHT TRAINING WALL D/S OF BOX SECTION. 2 RIVETED STEEL PIPES ARE RUSTED, 12" ONE IS FULL OF DIRT AT D/S END. RANDOM EFFLORESCENCE & SCALING OF SPILLWAY CONCRETE. STEEL I-BEAMS AND PLATE ARCHES ARE RUSTED W/ SOME HOLES THROUGH ARCHES.

~~c. Condition of Auxiliary Spillway~~

C. CONDITION OF AUXILIARY SPILLWAY - N/A.

d. Condition of Discharge Channel 10± CONCRETE PAVED CHANNEL @ D/S END OF SPILLWAY DROPPING OF INTO NATURAL ROCK GORGE, VERTICAL DROP OF 40'+. NATURAL ROCK LEFT SIDE + EARTH (TOP 20'±) W/ ROCK RIGHT SIDE. SLOUGH IS JUST TO RIGHT SIDE. CONCRETE PAVING ERODED DUE TO WATER ACTION.

8. RESERVOIR DRAIN/OUTLET

a. Type: Pipe ✓ Conduit _____ Other _____

b. Material: Concrete _____ Metal ✓ Other _____

c. Size: 18" Length 130' (ESTIMATED) } SEE H+H DATA CHECKLIST, APPENDIX C

d. Invert Elevations: Entrance 2096 EST. Exit 2096.1 }

e. Physical Condition (Describe)

Unobservable RUSTED + PITTED. BOTTOM RUSTED OUT IN PLACES

1) Material RIVETED STEEL

2) Joints NOT OBSERVABLE Alignment APPEARS GOOD

3) Structural Integrity PIPE IN POOR SHAPE. APPEARS TO BE LAID UP DRY STONE MASONRY SURROUNDING PIPE WHICH SUPPORTS EARTH AROUND PIPE. VOID BETWEEN STONE + PIPE.

4) Hydraulic Capability APPEARS OKAY. MUCH OF FLOW WHEN GATE AT U/S END IS OPEN IS FLOWING ALONG OUTSIDE OF + NOT IN PIPE

f. Means of Control: Gate ✓ Valve ____ Uncontrolled ____

Operation: Operable ✓ Inoperable ____ Other _____

Present Condition (Describe) GATE UNOBSERVABLE. RACK GEAR GATE OPERATING CONTROL MECHANISM IS OPERABLE, LUBRICATED, + SOMEWHAT RUSTED. GATE STEM TO GATE PROTECTED BY A WELDED STEEL BOX SECTION THAT SURROUNDS IT. WOOD PORTION OF RACK MECHANISM IS BARE WOOD (OBSERVABLE PORTION) AND ONLY IN FAIR SHAPE. CONDITION OF UNOBSERVABLE PORTION IS UNKNOWN.

g. Other Outlets (water mains, diversion pipes) N/A

0920 Name of Dam Bear Gulch Pond Dam Date May 5, 1981 7

9. STRUCTURAL

a. Concrete Surfaces ERODED & DETERIORATED CONCRETE IN SPILLWAY. ALSO EFFLORESCENCE & SCALING.

b. Structural Cracking STRUCTURAL CRACKS IN SPILLWAY 2" WIDE VERTICAL CRACK IN RIGHT TRAINING WALL & 1.5" WIDE CRACK ACROSS TOP. CURBING ON TOP HAS DIAGONAL CRACK, RIGHT SIDE.

c. Movement - Horizontal & Vertical Alignment(Settlement) D/S 6' OF BOX CULVERT IS SETTLING - INDICATED BY CRACKING LOCATION. CURBING TILTED D/S.

GEI d. Junctions with Abutments or Embankments Not applicable

GEI e. Drains - Foundation, Joint, Face Not applicable

f. Water Passages, Conduits, Sluices SEE SERVICE SPILLWAY AND 9. a. & 9. b. ABOVE.

GEI g. Seepage or Leakage Not applicable.

h. Joints - Construction, etc. APPEAR OKAY IN GENERAL BUT EROSION + DETERIORATED CONCRETE AT RIGHT WALL + BOTTOM CONCRETE INTERFACE. COLD POUR JOINTS OF SPILLWAY CONCRETE ARE VISIBLE.

GEI i. Foundation Not applicable

GEI j. Abutments Not applicable

k. Control Gates NONE.

l. Approach & Outlet Channels RESERVOIR TAPERS INTO SPILLWAY AT APPROACH AREA. ERODED AREA OF EMBANKMENT ON LEFT + NATURAL ROCK ON LEFT. RESERVOIR BOTTOM SLOPES UP GRADUALLY TO SPILLWAY CULVERTS. STEEP ROCK GORGE IMMEDIATELY D/S OF SPILLWAY. D/S OF OUTLET PIPE FLAT AREA W/ SOME OVERBURDEN. FLOW AREA ABOUT 10' WIDE + FALLS OFF ROCK LEDGE ABOUT 40' D/S OF OUTLET PIPE END. THEN TO ROCK GORGE WHICH INTERSECTS GORGE D/S OF SPILLWAY FURTHER D/S.

m. Energy Dissipators (Plunge Pool, etc.) N/A

n. Intake Structures NOT OBSERVABLE

o. Stability SLOUGH IN D/S FACE NEAR SPILLWAY.

p. Miscellaneous N/A.

8876 Name of Dam BEAR GULCH POND DAM Date MAY 5, 1981 9

10. APPURTENANT STRUCTURES (Power House, Lock, Gatehouse, Service Bridge, Other)

a. Description:

GATE HOUSE - BARE WOOD STRUCTURE, 2.5' x 2.5' SQUARE ON CONCRETE HEADWALL IN U/S CREST OF DAM. DOOR IS KEPT PADLOCKED.

b. Condition:

GATE HOUSE - U/S HEADWALL IN GOOD CONDITION W/ SOME EROSION OF CONCRETE DUE TO WATER ACTION + WEATHER. BUILDING IS UNPAINTED + STRUTURALLY SOUND.

11. MISCELLANEOUS MECHANICAL/ELECTRICAL EQUIPMENT

a. Description: N/A

b. Condition:

12. OTHER

87 9

APPENDIX C

HYDROLOGIC AND HYDRAULIC ENGINEERING DATA

CHECKLIST AND COMPUTATIONS

TABLE OF CONTENTS

4595

PHASE I INSPECTION

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA CHECKLIST

Name of Dam BEAR GULCH POND DAM Fed. Id.# NY01089

1. AREA-CAPACITY DATA

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
a. Top of Dam	2113.5	56.4 EST.	391
b. Design High Water (Max. Design Pool)	UNKNOWN		
c. Auxiliary Spillway Crest	N/A		
d. Pool Level with Flashboards	N/A		
e. Service Spillway Crest *	2110	45.8	214

* INLET INVERT OF LARGEST CULVERT OF SPILLWAY

2. DISCHARGES

	Volume (cfs)
a. Average Daily	UNKNOWN
b. Spillway @ Top of Dam	103
c. Spillway @ Design High Water	UNKNOWN
d. Service Spillway @ Auxiliary Spillway Crest Elevation	N/A
e. Low Level Outlet (w/ WATER SURFACE AT TOP OF DAM) NORMALLY CLOSED (W/ W.S. AT SPILLWAY CREST, Q = 31 cfs)	35
f. Total (of all facilities) @ Top of Dam	138
g. Maximum Known Flood	UNKNOWN
h. At Time of Inspection APRIL 29, 1981 (W.S. EL 2110.1 SPILLWAY ONLY)	2±
MAY 5, 1981 (W.S. EL 2109 OUTLET PIPE ONLY)	30±

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3. TOP OF DAM

Elevation 2113.5

a. Type EARTH DAM W/ DRY STONE MASONRY WALL ON D/S SIDE

b. Width 30' Length 315'

c. Spillover CULVERT SERVICE SPILLWAY

d. Location NEAR LEFT ABUTMENT

4. SPILLWAY

	SERVICE	AUXILIARY
a.	2110.0 (1) Elevation	N/A
b.	CULVERT [SEE NOTE (1)] Type	
	AT U/S END 3 PIPES:	
c.	42", 30", + 12" Width	

Type of Control

d. ✓ Uncontrolled

Controlled:

e. Type (Flashboards; gate)

f. Number

g. Size/Length

42" + 12" ARE RIVETED

h. STEEL, 30" IS CMP Invert Material

i. Anticipated Length of Operating Service

j. 30'± TOTAL CULVERT ~~Chute~~ Length

k. N/A (PIPE FLOW) Height Between Spillway Crest & Approach Channel Invert (Weir Flow)

l. Other

(1) INVERT OF LARGEST (42-INCH) CULVERT PIPE AT U/S END. ALSO A 30-INCH + A 12-INCH CULVERT PIPE. ALL 3 PIPES ABOUT 10' LONG AND EMPTY INTO A CONCRETE BOX CULVERT ABOUT 6' x 5' WHICH IS ABOUT 20'± LONG THAT RUNS THROUGH DAM.

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5. OUTLET STRUCTURES/EMERGENCY DRAWDOWN FACILITIES

a. Type: Gate ____ Sluice ____ Conduit √ Penstock ____

b. Shape RIVETED STEEL PIPE

c. Size 18" DIA

d. Elevations: Entrance Invert 2096± EST

Exit Invert 2096.1 (PER FIELD SURVEY)

e. Tailrace Channel: Elevation 2096 ±

6. FLOOD WATER CONTROL SYSTEM

a. Warning System NONE

b. Method of Controled Releases (mechanisms) GATE ON U/S END OF OUTLET PIPE IS OPERATED BY OWNER AS REQUIRED

7. CLIMATOLOGICAL GAGES REFERENCES 21+22

a. Type NON RECORDING PRECIPITATION + TEMPERATURE GAGE INDEX # 1593

b. Location COLLESKILL, LAT. 42° 40', LONG. 74° 30', 5 MILES S.W. OF DAM

c. Period of Record 25 YEARS FOR PRECIPITATION

d. Maximum Reading UNKNOWN Date ____

8. STREAM GAGES REFERENCE 23

a. Type WATER - STAGE RECORDER USGS GAGE # 01350200

b. Location WEST KILL AT NORTH BLENHEIM, NY

LAT. 42° 28' 07", LONG. 74° 27' 34", ABOUT 10 MILES S.E. OF DAM

c. Period of Record 1970 TO 1977, 1975 TO CURRENT YEAR

d. Maximum Reading DRAINAGE AREA = 44.6 S.M. 12,100 c/s = 271.3 cms Date OCT. 18, 1975

9. OTHER

6169

10. DRAINAGE BASIN CHARACTERISTICS

a. Drainage Area 0.744 SQUARE MILES OR 476 ACRES

b. Land Use - Type RURAL RESIDENTIAL + WOODLANDS

c. Terrain - Relief WOODED & GRASSED SLOPES OF 10% TO 15%.

d. Surface - Soil GLACIAL TILL (?)

e. Runoff Potential (existing or planned extensive alterations to existing surface or subsurface conditions)

NONE KNOWN.

f. Potential Sedimentation Problem Areas (natural or man-made; present or future)

NONE KNOWN.

g. Potential Backwater Problem Areas for Levels at Maximum Storage Capacity (including surcharge storage)

NONE KNOWN. POSSIBLE HOUSES & CAMPS AROUND POND.

h. Dikes - Floodwalls (overflow & non-overflow) - Low Reaches Along the Reservoir perimeter

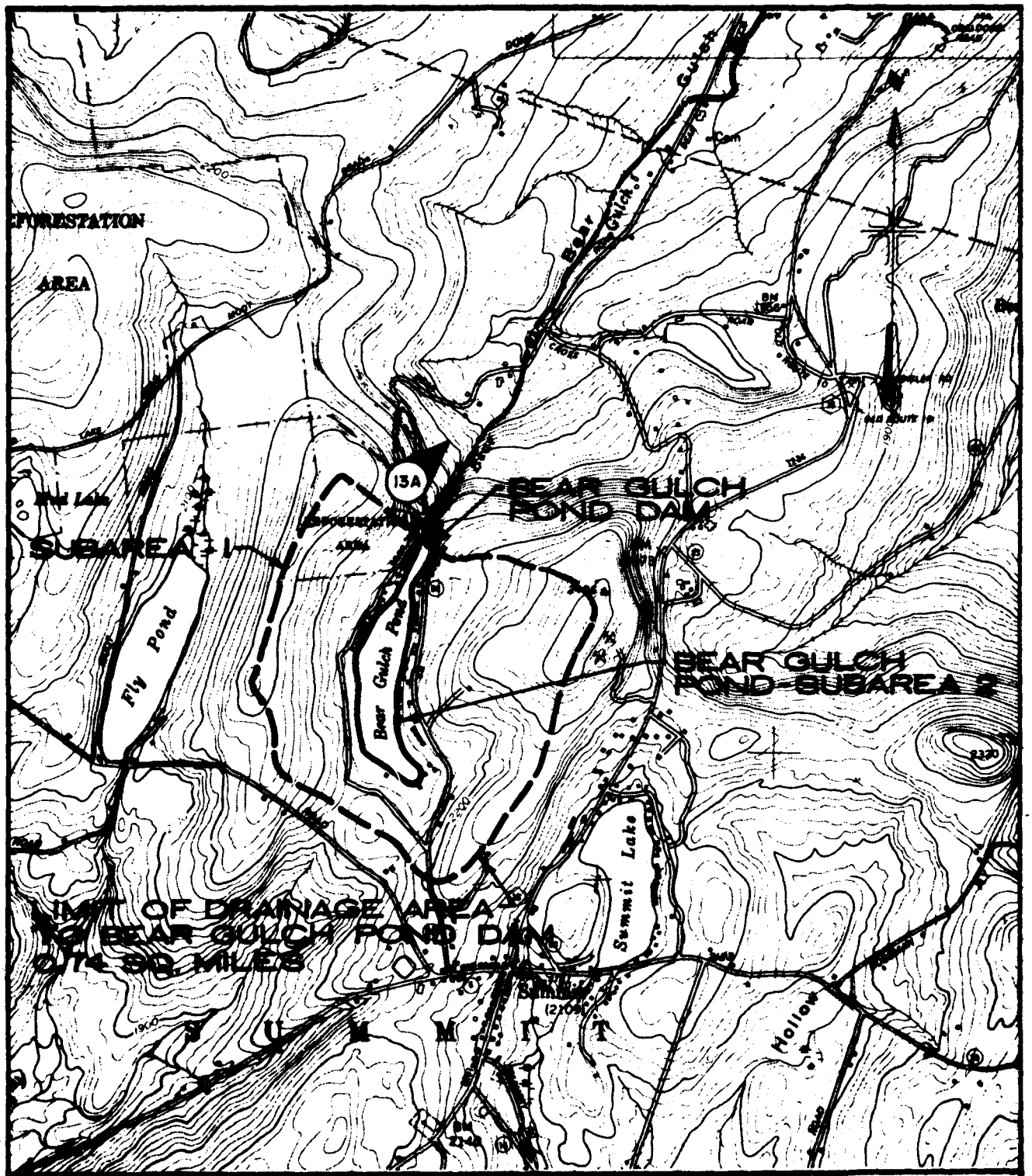
Location NONE

Elevation _____

i. Reservoir

Length @ ~~Maximum Design~~ SPILLWAY CREST Pool 3400± (feet)

Length of Shoreline (@ Service Spillway Crest) 8,400± (feet)



APPROXIMATE SCALE IN FEET
0 2000 4000

DATUM - NGVD 1929

BASE MAP - 7.5' NYSDOT TOPO QUAD
20' CONTOUR INTERVAL
SUMMIT, N.Y. - 1977

PROJECT NO. 58.01.015/80.855

BEAR GULCH POND DAM
DRAINAGE AREA MAP

TOWN OF SUMMIT	SCHOHARIE CO., N.Y.
SCALE: 1"= 2000'	DATE: JANUARY 1981

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COMPUTER SERVICES LANDSCAPE ARCHITECTURE LABORATORY SERVICES

JOB BEAR GULCH POND DAM
SHEET NO. ____ OF ____
CALCULATED BY ELV DATE 5/13/81
CHECKED BY [illegible] DATE 7/2/81
SCALE 58.01.00015

ELEVATION - AREA - STORAGE COMPUTATIONS

RESERVOIR VOLUME: COMPUTED BY PROGRAM USING METHOD OF CONIC SECTIONS $\Delta V_{1,2} = h/3 (A_1 + A_2 + \sqrt{A_1 A_2})$

	ELEVATION (NGVD-ft.)	INPUT AREA (acres)	VOLUME (acre-feet)
	2096 (1)	0	0
SPILLWAY CREST	2110 (2)	45.8 (4)	214
TOP OF DAM	2113.5 (3)	56.4 ESTIMATE	391
	2120	76.0 (5)	816

(1) ESTIMATED BOTTOM OF POND & OUTLET INVERT FROM SKETCH (ALLOW 1' FOR SILT SINCE 1934), APPENDIX F3-5.
(2) FROM GAZETTEER OF LAKES, REFERENCE 25.
(3) FROM FIELD MEASUREMENTS. SOME AREAS SLIGHTLY LOWER, ROAD OVER SPILLWAY HIGHER
(4) FROM SCHOHARIE COUNTY TAX MAP, SECTION 100.04.
(5) FROM USGS CONTOUR MAPPING (DRAINAGE AREA MAP).

DRAINAGE AREA

	AREA (acres)	AREA (Square miles)
WATERSHED DIRECT TO RESERVOIR (SUBAREA 1)	430.2	0.672
RESERVOIR SURFACE (SUBAREA 2) @ SPILLWAY CREST EL = 2110	45.8	0.072
TOTAL	476.0	0.744

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JOB BEAR GULCH POND DAM
SHEET NO. ____ OF ____
CALCULATED BY ELV DATE 5/14/81
CHECKED BY DM DATE 7/2/81
SCALE 58.01.00015

DRAINAGE AREA DATA FOR HEC-1 DB MODEL

SUBAREA 1: AREA TRIBUTARY DIRECTLY TO RESERVOIR
AREA = .672 SQUARE MILES

LOSS RATES: 1.0" - INITIALLY
0.1"/HOUR - CONSTANT LOSS RATE

UNIT HYDROGRAPH PARAMETERS: USE SNYDER METHOD

A = DRAINAGE AREA = .672 SQUARE MILES
L = LENGTH OF MAIN WATERCOURSE TO UPSTREAM LIMIT OF DRAINAGE AREA = .50 MILES
L_{CA} = LENGTH ALONG MAIN WATERCOURSE TO POINT OPPOSITE THE CENTROID OF THE DRAINAGE AREA = .17 MILES
C_t = SNYDER'S BASIN COEFFICIENT = 2.0 ASSUMED AVERAGE
C_p = SNYDER'S PEAKING COEFFICIENT = .76 (FROM REF. 20)
t_p = STANDARD LAG IN HOURS = $C_t (L L_{CA})^{0.3}$ = .95 HOURS

$\therefore$ USE $t_p = 1.0$ HOURS

REQUIRED UNIT RAINFALL DURATION = t_r
$t_r = \frac{t_p}{5.5} = \frac{0.95}{5.5} = 0.17$ hr $\approx$ 10.4 min. max
USE t_r = 10 min < 10.4 min OK

SUBAREA 2: RESERVOIR SURFACE, AREA = .072 SQ. MILES = 45.8 ACRES

LOSS RATES: NONE BECAUSE RAINFALL $\approx$ RUNOFF FOR WATER SURFACE

UNIT HYDROGRAPH PARAMETERS:

FOR U.H. W/ 10 MINUTE DURATION + 1" RAIN

$$\bar{Q} = \frac{A(1")}{t} = \frac{45.8 \text{ acres } (1")}{10 \text{ minutes}} \left(\frac{43{,}560 \text{ sq FT}}{1 \text{ acre}}\right)\left(\frac{1 \text{ FT}}{12 \text{ inches}}\right)\left(\frac{1 \text{ minute}}{60 \text{ seconds}}\right)$$

$\bar{Q} = 277$ cfs (W/O LOSS RATE)

Form CELL-405

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JOB BEAR GULCH POND DAM
SHEET NO. ____ OF ____
CALCULATED BY ELV DATE 5/13/81
CHECKED BY [illegible] DATE 7/2/81
SCALE 58.01.00015

DISCHARGE COMPUTATIONS

SPILLWAY CAPACITY

SPILLWAY CONSISTS OF 3 CULVERTS AT UPSTREAM SIDE OF DAM TO A CONCRETE BOX CULVERT THROUGH DAM. TOTAL LENGTH OF SPILLWAY THROUGH DAM IS ABOUT 30' ± SO WE WILL ASSUME SPILLWAY W/ INLET CONTROL DUE TO 3 CULVERT PIPES, LENGTH = 10' ± FREE DISCHARGE CONDITION BECAUSE OF MUCH LARGER (6'×5') BOX CULVERT.

FOR SPILLWAY CULVERTS: $Q = CA\sqrt{2gh}$ FORMULA FOR ORIFICE FLOW (INLET CONTROL), SEE REF. 9

SPILLWAY CULVERTS (SHOULD BE LIBERAL FOR ALL HEADS) LET C = 0.6 ± (REF. 9) $A = \pi r^2$

#1:	42" RIVETED STEEL	INV. EL 2110.0	A = 9.62 SQ. FT.
#2:	30" CORRUGATED STEEL	INV. EL 2109.9	A = 4.91 SQ. FT.
#3:	12" RIVETED STEEL	INV. EL 2110.7	A = 0.79 SQ. FT.

ELEVATION (NGVD)	h_1 (1) (ft.)	h_2 (1) (ft.)	h_3 (1) (ft.)	42" $Q_{\#1}$ (cfs)	30" $Q_{\#2}$ (cfs)	12" $Q_{\#3}$ (cfs)	Q SPILLWAY (TOTAL) (cfs)	
℄	2111.75	2111.15	2111.2					
2109.9	—	INV.	—	0	0	0 (2)	0	
2110.0	INV.	—	—	0	1	0	1	
2110.7	—	—	INV.	8	8	0	16	
2111	—	—	—	12	12	1	25	
2112	.25	.85	.8	23	22	3	48	
2113	1.25	1.85	1.8	52	32	5	89	
2113.5	1.75	2.35	2.3	61	36	6	103	TOP OF DAM
2114	2.25	2.85	2.8	69	40	6	115	
2115	3.25	3.85	3.8	84	46	7	137	
2116	4.25	4.85	4.8	95	52	8	155	

(1) TOP OF DAM ↓ INLET SUBMERGED

(1) h = HEIGHT FROM WATER SURFACE TO ℄ CULVERT

(2) WATER SURFACE BELOW ℄ OF CULVERT, Q VALUES APPROXIMATED BY LINEAR INTERPOLATION.

Form CTM-105

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JOB BEAR GULCH POND DAM
SHEET NO. ____ OF ____
CALCULATED BY ELV DATE 5/14/81
CHECKED BY [illegible] DATE 7/2/81
SCALE 58.01.00015

DISCHARGE COMPUTATIONS

DAM APPURTENANCE	ELEVATION (NGVD)	SIZE
CULVERT SPILLWAY (3 CULVERTS U/S)	INVERT EL = 2110.0	42" DIA
	INVERT EL = 2109.9	30" DIA
	INVERT EL = 2110.7	12" DIA
DAM	TOP OF DAM EL = 2113.5 (AVERAGE HEIGHT)	315' CREST LENGTH
OUTLET PIPE	INVERT EL ≈ 2096	18" DIA

FOR FLOW OVER DAM: $Q = 3.087 L H^{1.5}$ (FORMULA FOR CRITICAL FLOW OVER BROAD-CRESTED WEIR, REF. 9)

INPUT

	ELEVATION (NGVD)	h_{DAM} (ft.)	Q_{OUTLET} (cfs)	$Q_{SPILLWAY}$ (TOTAL) (cfs)	Q_{DAM} (cfs)	Q_{TOTAL} (cfs)
INVERT SPILLWAY CULVERT #2	2109.9	0	0	0	0	0
" #1	2110.0	0	ASSUMED CLOSED	1	0	1
" #3	2110.7	0		16	0	16
	2111	0		25	0	25
	2112	0		48	0	48
	2113	0		89	0	89
TOP OF DAM	2113.5	0		103	0	103
	2114	.5		115	344	459
	2115	1.5		137	1,786	1,923
	2116	2.5	0	155	3,844	3,999

F—CT—105

```
A NYD DAM INSPECTIONS DACW51-81-C-0014
A NY01084, BEAR GULCH POND DAM, 80.855
A OVERTOPPING ANALYSIS BGPD1
B    260       0      10                                          4
B1     5
J      1       2       1
J1   1.0     0.5
K      0    SA-1                                                  1
K1 SUBAREA 1 RUNOFF COMPUTATION
M      1       1    .072              10                          1
P             19.5     111     123     132     142
T                                                  1.0     .10
W    1.0     .76
X     -2               1
K      0    SA-2                                                  1
K1 SUBAREA 2 (RESERVOIR) RUNOFF COMPUTATION
M      1      -1    .072              10                          1
P             19.5     111     123     132     142
T                                                  0       0
U      1
U1   227
X     -2               1
K      2   SA-2C                                                  1
K1 COMBINING HYDROGRAPHS 1 & 2
K      1     RES                      2                          1
K1 ROUTING FLOWS THROUGH RESERVOIR
Y                                     1       1
Y1     1                                                 -2110     -1
Y2 2109.9    2110  2110.7    2111    2112    2113  2113.5    2114    2115    2116
Y5     0       1      16      25      48      89     103     115     137     155
SA     0    45.8    76.0
SE  2096    2110    2120
S9  2110
S0 2113.5   3.087     1.5     315
K     99
A
A
A
A
A
```

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE: 7/02/81
     TIME:11:25 AM

NYD DAM INSPECTION: DACW51-81-C-0014
NY01069, BEAR GULCH POND DAM, 60.855
OVERTOPPING ANALYSIS BGPU1

                    JOB SPECIFICATION
 NO    NHR   NMIN   IDAY   IHR   IMIN   METRC   IPLT   IPRT   NSTAN
288     0     10      0     0      0       0      0      4       0
                    JUPER   NMI   LROPT   TRACE
                      5      0      0       0

          MULTI-PLAN ANALYSES TO BE PERFORMED
               NPLAN= 1 NRTIO= 2 LRTIO= 1
     RTIOS=  1.00   0.50

**********  **********  **********  **********  **********
          SUB-AREA RUNOFF COMPUTATION

SUBAREA 1 RUNOFF COMPUTATION
                 ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME   ISTAGE   IAUTO
                  SA-1      0       0       0      0      0      1       0        0
                    HYDROGRAPH DATA
 IHYDG    IUHG    TAREA    SNAP    TRSDA    TRSPC    RATIO   ISNOW   ISAME   LOCAL
   1        1      0.67     0.00    10.00    0.00     0.000     0       1       0
                    PRECIP DATA
              SPFE     PMS      R6      R12     R24     R48     R72     R96
              0.00    19.50   111.00   123.00  132.00  142.00   0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.800
                    LOSS DATA
 LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
   0     0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.00
                  UNIT HYDROGRAPH DATA
                  TP= 1.00    CP=0.76    NTA= 0
                  RECESSION DATA
                  STRTQ= -2.00    QRCSN= 0.00    RTIOR= 1.00
 UNIT HYDROGRAPH 23 END-OF-PERIOD ORDINATES, LAG= 0.99 HOURS, CP= 0.75  VOL= 1.00
  23.    83.    159.    238.    301.    331.    327.    281.    215.    161.
 121.    91.     68.     51.     38.     28.     21.     16.     12.      9.
   7.     5.      4.
 0                  END-OF-PERIOD FLOW
 HO.DA HR.MN PERIOD   RAIN   EXCS   LOSS   COMP Q        HO.DA HR.MN PERIOD   RAIN   EXCS   LOSS   COMP Q
                                                  SUM  22.15  18.49   3.66   48103.
                                                       ( 563.1( 470.1(  93.1( 1362.12)
```

SUB-AREA RUNOFF COMPUTATION

SUBAREA 2 (RESERVOIR) RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
SA-2	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	-1	0.07	0.00	10.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	19.50	111.00	123.00	132.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00

RECESSION DATA

STRTQ= -2.00 QRCSN= 0.00 RTIOR= 1.00

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	22.15	22.15	0.00	5071.
										(563.1(	563.1(	0.1(	143.59)

COMBINE HYDROGRAPHS

COMBINING HYDROGRAPHS 1 & 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
SA-2C	2	0	0	0	0	1	0	0

HYDROGRAPH ROUTING

ROUTING FLOWS THROUGH RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
RES	1	0	0	2	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-2110.	-1

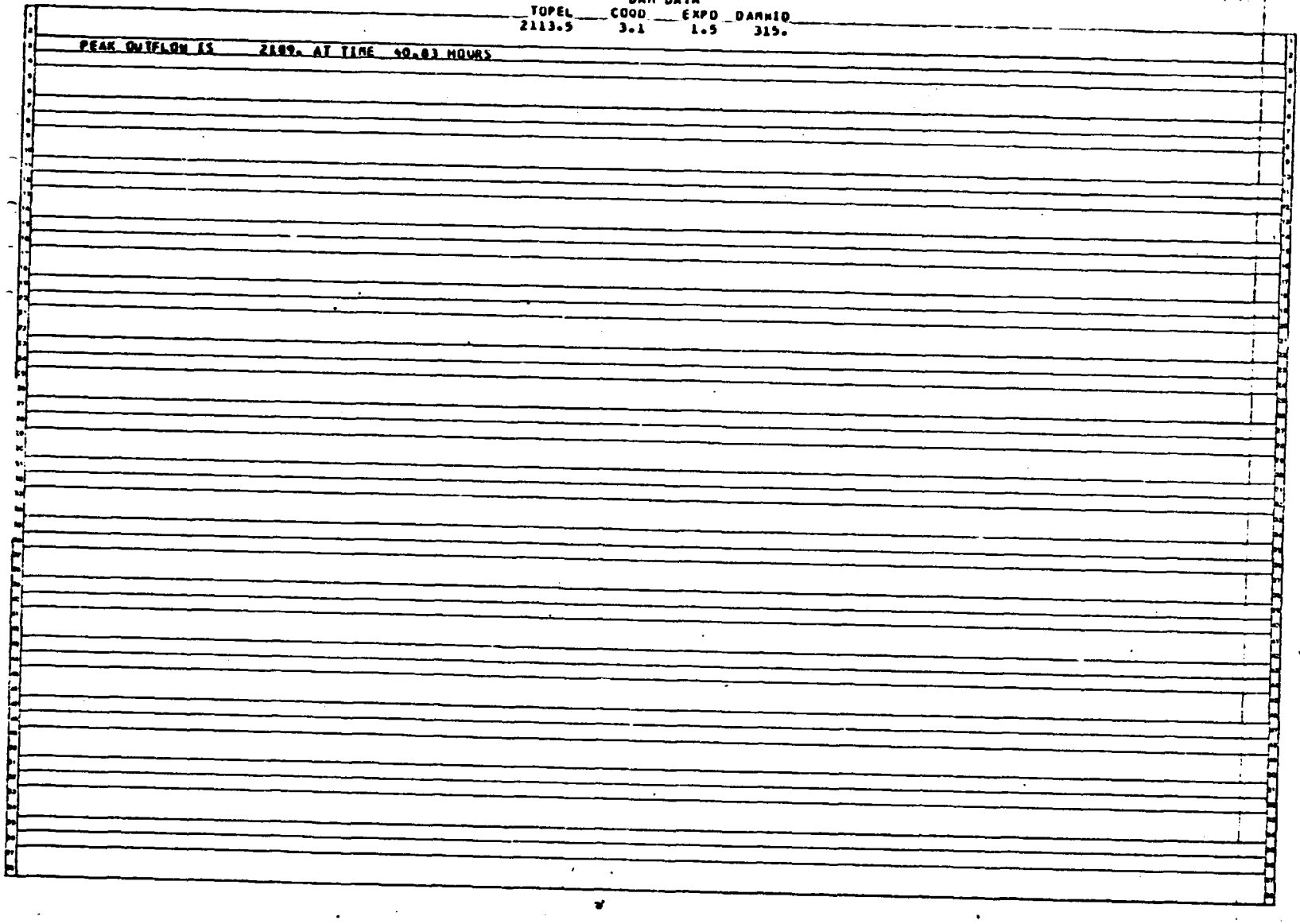
STAGE	2109.90	2110.00	2110.70	2111.00	2112.00	2113.00	2113.50	2114.00	2115.00
FLO=	0.00	1.00	16.00	25.00	48.00	89.00	103.00	115.00	137.00
SURFACE AREA=	0.	48.	76.						
CAPACITY=	0.	219.	816.						
ELEVATION=	2096.	2110.	2120.						

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
2110.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
2113.5	3.1	1.5	315.

PEAK OUTFLOW IS 2189. AT TIME 40.83 HOURS



PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

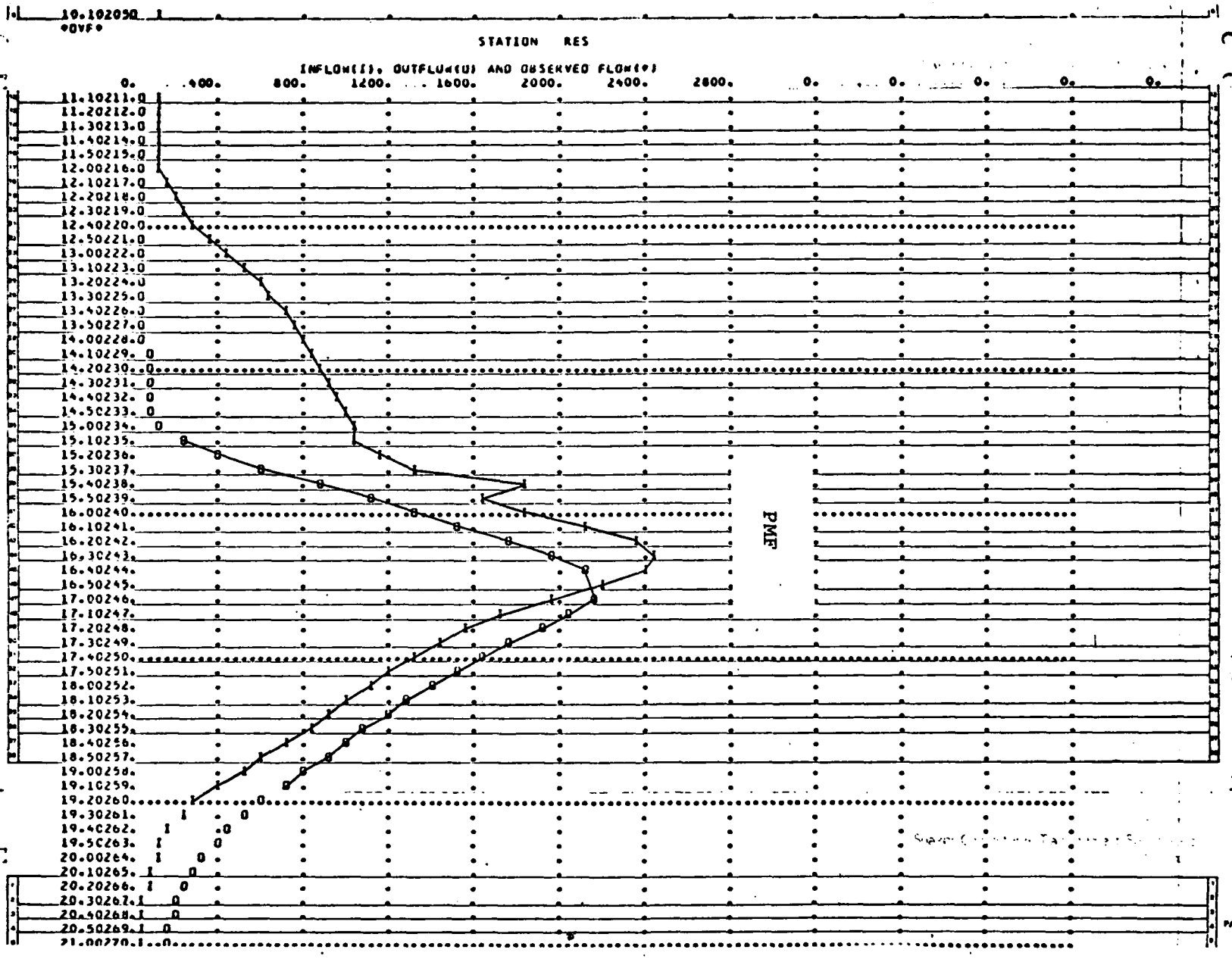
OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 0.50
HYDROGRAPH AT	SA-1	0.67	1	2149.	1174.
		(1.74)		(60.85)(	33.25)(
HYDROGRAPH AT	SA-2	0.07	1	672.	336.
		(0.19)		(19.04)(	9.52)(
2 COMBINED	SA-2C	0.74	1	2441.	1220.
		(1.93)		(69.11)(	34.56)(
ROUTED TO	RES	0.74	1	2189.	740.
		(1.93)		(62.00)(	20.96)(

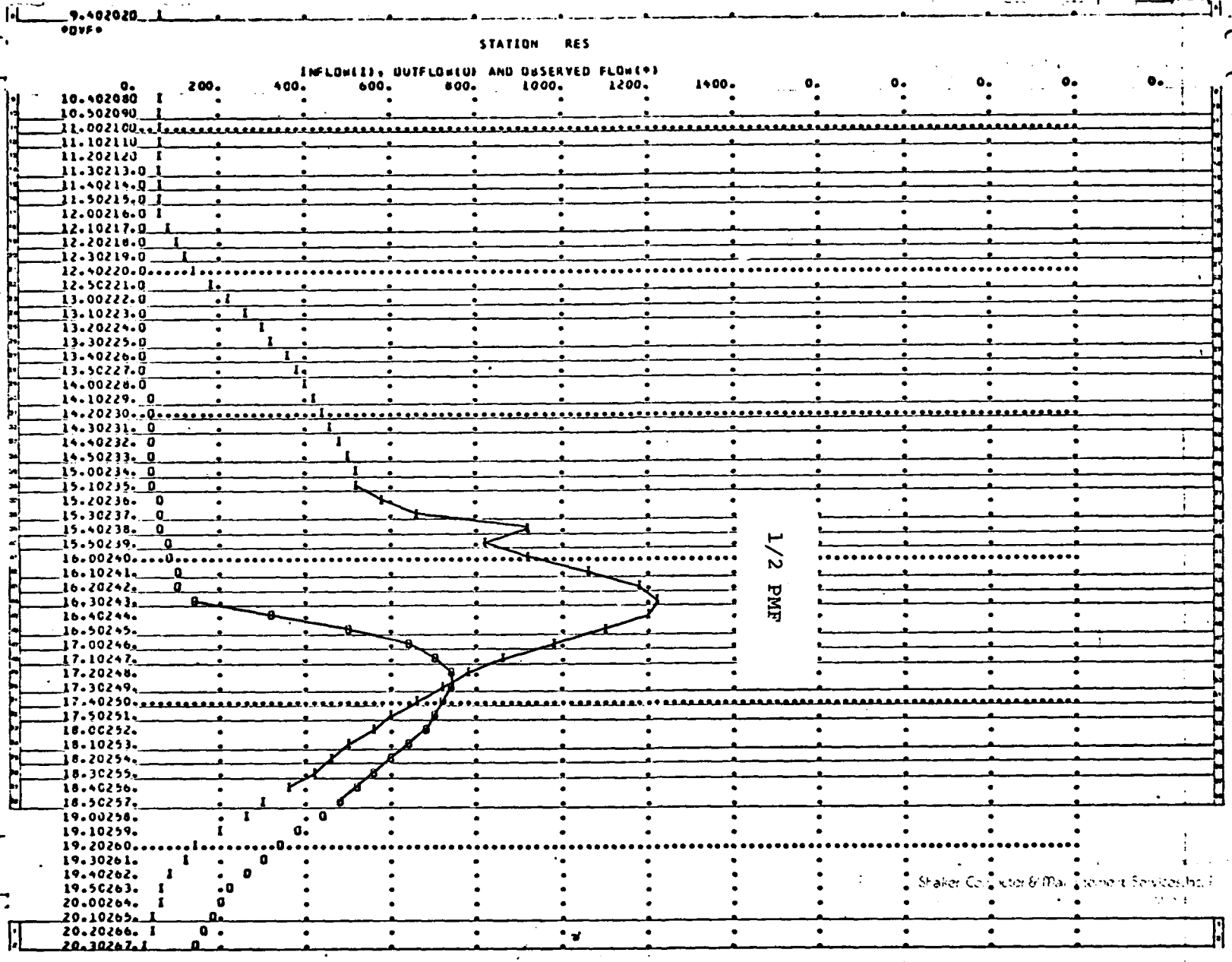
SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2110.00	2110.00	2113.50
STORAGE	214.	214.	391.
OUTFLOW	1.	1.	103.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	2119.14	1.64	486.	2189.	7.00	40.83	0.00
0.50	2114.24	0.74	433.	740.	4.83	41.50	0.00


STATION RES
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
0. 400. 800. 1200. 1600. 2000. 2400. 2800.
PME


STATION RES
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
0. 200. 400. 600. 800. 1000. 1200. 1400. 0. 0. 0. 0. 0.
1/2 PMF

APPENDIX D

STABILITY ANALYSIS

NO GRAVITY STRUCTURES TO ANALYZE

APPENDIX E

REFERENCES

BEAR GULCH POND DAM, NY 01089

PHASE I INSPECTION REPORT

REFERENCES

This is a general list of references pertinent to dam safety investigations. Not all references listed have necessarily been used in this specific report.

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21. "Climatological Data, Annual Summary, New York, 1979", Volume 91, No. 13, National Oceanic and Atmospheric Administration, Asheville, North Carolina.

22. "Climatological Data, New York, September 1980", Volume 92, No. 9, National Oceanic and Atmospheric Administration, Asheville, North Carolina.

23. "Water Resources Data For New York, Water Year 1979", Volume 1, USGS Water-Data Report NY-79-1, U.S. Geological Survey, Albany, New York, 1980.

24. "Maximum Known Stages and Discharges of New York Streams Through 1973", Bulletin 72, U.S. Geological Survey, 1976.

25. "Characteristics of New York Lakes (Gazetteer)", Bulletin 68, U.S. Geological Survey and NYS Department of Environmental Conservation, 1970.

26. "Geologic Map of New York", Hudson-Mohawk Sheet, New York State Museum and Science Service, University of the State of N.Y., State Education Dept., Albany, N.Y., reprinted 1973.

27. "Landforms and Bedrock Geology of New York State", New York State Museum and Science Service, University of the State of N.Y., State Education Dept., Albany, N.Y., reprinted 1973.

APPENDIX F

AVAILABLE ENGINEERING DATA AND RECORDS

TABLE OF CONTENTS

APPENDIX F

SECTION F1

LOCATION OF AVAILABLE ENGINEERING DATA AND RECORDS

1. Owner: Richmondville Water Co.
   Attn: Maynard Tillapaugh
   98 North Grand Street
   Cobleskill, NY 12043
   518-234-2952 at home
   518-294-7252 at feed store in Richmondville

   Available: No data.

2. Designer: Unknown.

3. Construction Contractor: Unknown.

4. Agency: NYS Department of Environmental Conservation
   50 Wolf Road
   Albany, NY 12233
   Attn: George Koch, P.E., Chief, Dam Safety Section
   518-457-5557

   Available: Inspection reports, letters.

   NYS Department of Environmental Conservation
   Division of Fish & Wildlife
   50 Wolf Road
   Albany, NY 12233
   Attn: Patrick Festa, Supervising Aquatic Biologist
   518-457-6937

   Available: Data on the pond.

4585

PHASE I INSPECTION

CHECKLIST FOR GENERAL ENGINEERING DATA
& INTERVIEW WITH DAM OWNER

Name of Dam BEAR GULCH POND DAM Fed. Id.# NY 01089

Date May 5, 1981 Interviewer(s) Thomas P. Bennedum

Dam Owner/Representative(s) Interviewed, Title & Phone#

Maynard Tillapaugh, Owner (see 1 below), Larry Dibble, T/Summit Hwy. Supt. GAC. 518-287-1379 H 518-287-1544, Edwin Dimmler, T/Summit Supervisor H 518-287-1550
Kevin P. Neary, Dir. Schoharie Co. Aff. Disaster Preparedness, 518-295-7244

1. OWNERSHIP (name, title, address & phone #)
Maynard Tillapaugh 98 N. Grand St. Cobleskill, NY 12043, H 518-234-2952
Feed Store in Richmondville 518-294-7252, since 1950 owned land under pond & 10 shares of Co. that owns dam (shares came w/feed store)

2. OPERATOR (name, title, address & phone # of person responsible for day-to-day operation)
Maynard Tillapaugh (See 1 Above)
Tax bills sent to Richmondville Water Co., C/o Maynard Tillapaugh
(See OTHER on F2-5)

a. Operator Full/Part time Part Time

3. PURPOSE OF DAM

a. Past Water storage for water wheels lower along creek. As many as 7 sawmills at one time. Water wheel in feed store last used in 1963. It powered feed grinder.

b. Present
Recreation, houses & camps around lake, 70% summer 30% year round

4. DESIGN DATA

a. Designed When Unknown

b. By (name, address, phone #, business status)
Unknown

c. Geology Reports None known

d. Subsurface Investigations None known

e. Design Reports/Computations (H&H, stability, seepage)
None known

4591

f. Design Drawings (plans, sections, details) None known

g. Design Specifications None known

h. Other n/a

5. CONSTRUCTION HISTORY

a. Initial Construction Owner feels that original dam further upstream was one built

1) Completed When Early 1900's per Owner in 1871 reported in App. F3-7 (Inventory lists 1920) SAY 1910

2) By (name, address, phone #, business status) Richmondville Water Co. (also referred to as Richmondville Power Co. in Appendix F3-4) John Westover reportedly connected w/ construction.

3) Borrow Sources/Material Tests None known.

4) Construction Reports/Photos None known

5) Diversion Scheme/Construction Sequence Unknown

6) Construction Problems No Data

7) As-Built Drawings (plans, sections, details) None known

8) Data on Electrical & Mechanical Equipment Affecting Safe Operation of Dam No electric at dam. No data on gate mechanisms.

9) Other Maynard Tillapaugh seems to be only surviving shareholder of Richmondville Water Co.

4576

b. Modifications (review design data & initial construction items as applicable & describe)

• 1970 when pond was drained, extended outlet pipe about 40' upstream w/ 18" steel pipe & added a riser intake about 6' high made of 3' ϕ steel pipe w/ holes & trash grate across top.

• FALL 1978 T/Hwy Dept. put 3 culverts on u/s side of spillway of various sizes (still there)

c. Repairs & Maintenance (review design data & initial construction items as applicable & describe)

• 1970 Town & Co. Hwy. Dept. personnel operated gate, drained pond, T/Hwy. Dept. put large rock w/ shale cover on u/s side of dam.

• 1980 T/Hwy. Dept. put new about 8" of new shale cover on the roadway across dam.

6. OPERATION RECORD

a. Past Inspections (dates, by, authority, results)

• Dec. 22, 1969, by NYS-DOT, see App. F3-7 for report.

• Jan. 29, 1970 by NYS-Water Resources Comm. (Reference only App. F3-13)

• Nov. 11, 1970 by NYS-DEC, see App. F3-16

b. Performance Observations (seepage, erosion, settlement, post-construction surveys, instrumentation & monitoring records) • Crack in right wall of spillway culvert noted about 1-inch wide in 1969 (See App. F3-7)

• Jan. 1970 settlement & sliding of u/s slope (see App. F3-13)

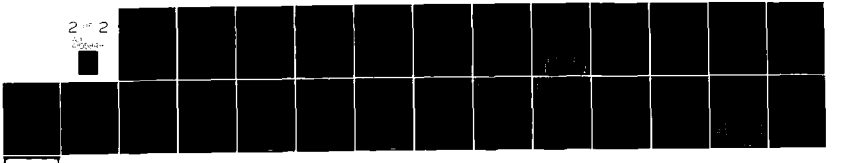
c. Post-Construction Engineering Studies/Reports

None known

d. Routine Rainfall, Reservoir Levels & Discharges No reservoir levels taken. Rainfall taken at official Weather Service Gauge in Cobleskill (see H&H Data Checklist App. C)

AD-A105 849 MALE (C T) ASSOCIATES SCHENECTADY NY F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. BEAR GULCH POND DAM (NY 01089)--ETC(U)
AUG 81 K J MALE DACW51-81-C-0014

UNCLASSIFIED NL



END
DATE FILMED
11-81
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4564

e. Past Floods That Threatened Safety (when, cause, discharge, max. pool elevation, any damage)

None known

f. Previous Failures (when, cause, describe)

• Jan. 1970 settlement & sliding of u/s slope (see App. F3-13) No actual failures.

g. Earthquake History (seismic activity in vicinity of dam)

None known

7. VALIDITY OF DESIGN, CONSTRUCTION & OPERATION RECORDS (note any apparent inconsistencies)

• Items commented on in 1970 letter (see App. F3-15) Approving sketch plan of modifications were never built, namely: new spillway culvert & emergency spillway over top of dam.

8. OPERATION & MAINTENANCE PROCEDURES

a. Operation Procedures in writing? No Obtain copy or describe. (reservoir regulation plan, normal pool elevation and status of operating facilities, who operates & means of communication to controller, mode of operating facilities, i.e., manual, automatic, remote)

• Water level at spillway crest normally.
• Gate normally closed, but sometimes opened in dry weather to keep flow in creek going.

b. Maintenance Procedures in writing? No Obtain copy or describe.

• Operator visits the dam randomly, perhaps 5 to 6 times during summer, less often in winter.

2425

c. Emergency Action Plan & Warning System in Writing? No
Obtain copy or describe. (actions to be taken to minimize the D/S effects of an emergency) _____

• Co. has std. disaster preparedness plan, but not helpful for this dam per Co. Director
• T/Hwy. Supt. has checked water level @ dam daily since last Thurs. April 30, day after DEC first inspected slough on d/s slope to right of spillway. Prior to that time, casually looked at dam once/week, sometimes more often.

9. OTHER

1) Ownership (cont'd)

James S. VanDeusen, Schoharie Co. Hwy. Supt., indicates that Co. does not own dam or road across dam. Co. ownership & maintenance end at end of pvmt short of right abutment of dam. Town of Summit maintains the unpaved road across dam.

APPENDIX F

SECTION F3

COPIES OF ENGINEERING DATA AND RECORDS

TABLE OF CONTENTS

S-159-474 Mohawk

Form W31. 5-12-16-2000 (16-1675S) Acc. 38a

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK
CONSERVATION COMMISSION
ALBANY

DAM REPORT

July 16, 1920
(Date)

CONSERVATION COMMISSION,

DIVISION OF WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the ..... Dam.

This dam is situated upon the Bear Gulch Creek
(Give name of stream)
in the Town of ....., Schoharie County,
about 4 miles (State distance) from the Village or City of Richmondville.
The distance ..... (Up or down) stream from the dam, to the ..... (Give name of nearest important stream or of a bridge);
is about ..... (State distance).

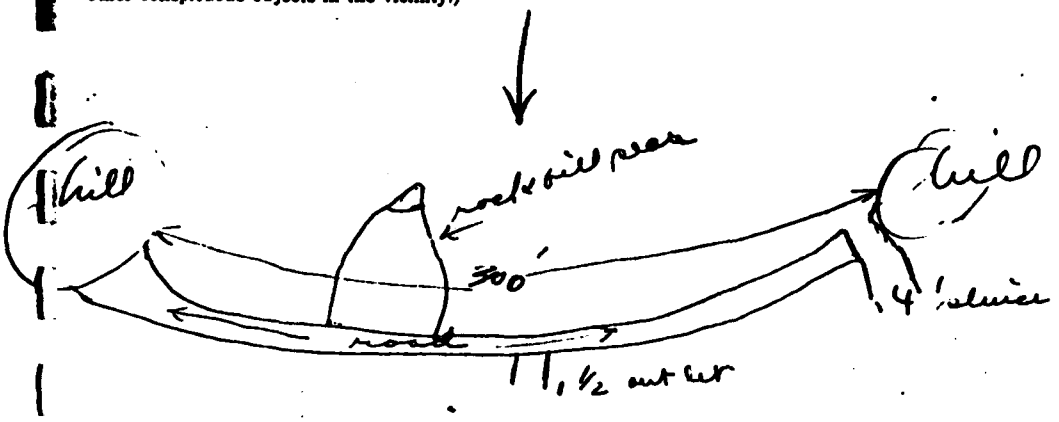
The dam is now owned by .....
(Give name and address in full)
and was built in or about the year old, and was extensively repaired or reconstructed during the year .....

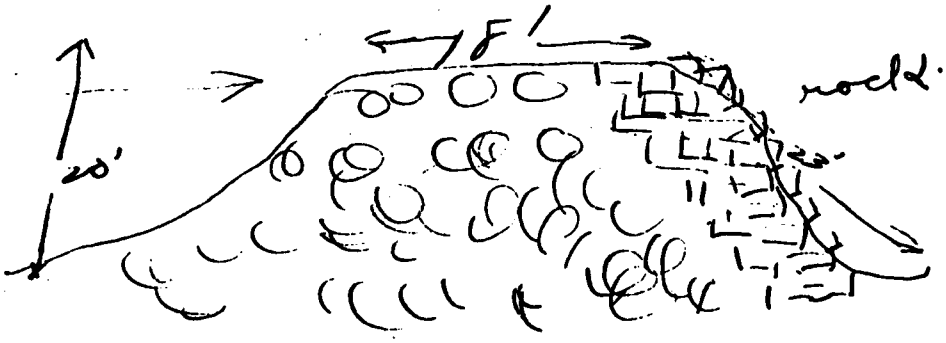
As it now stands, the spillway portion of this dam is built of wood
(State whether of masonry, concrete or timber)
and the other portions are built of rock fill
(State whether of masonry, concrete, earth or timber with or without rock fill)

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is Stratified and under the remaining portions such foundation bed is .....

DEC

(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.)





DEC

The total length of this dam is 300 feet. The spillway or waste-weir portion, is about 300 feet long, and the crest of the spillway is about ..... feet below the abutment.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: 4' gate 1½' out let opening

At the time of this inspection the water level above the dam was ..... ft. ..... in. below / above the crest of the spillway.

(State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks or erosions which you may have observed.)

O.K. Condition

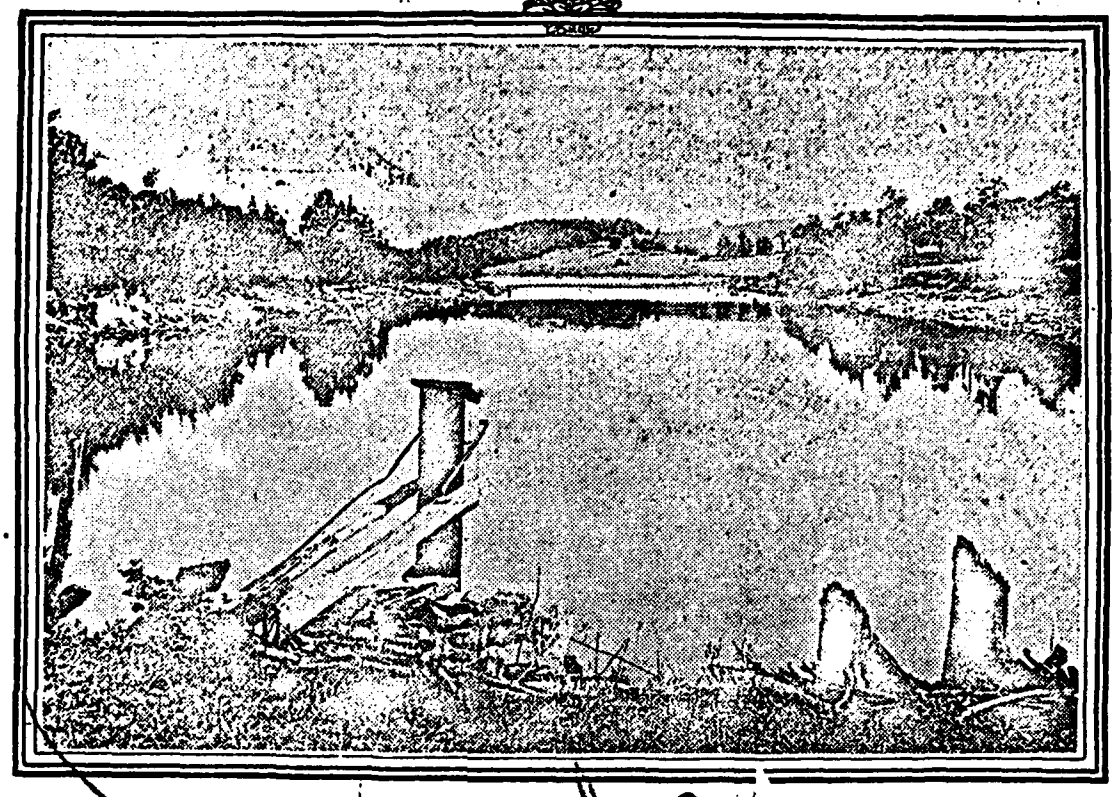
Reported by L. W. Palmer
(Signature)

.....
(Address—Street and number, P. O. Box or R. F. D. route)

.....
(Name of place)

DEC

BEAR GULCH POND NEAR SUMMIT OF MOUNTAIN NEAR RICHMONDVILLE, DAM OF WHICH HAS BEEN REPAIRED



HEARING ON AUTOMOBILE

BEAR GULCH DAM REPAIRED

Pond Near Richmondville Is Atop Schoharie County Mountain.

Special to The Knickerbocker Press.

RICHMONDVILLE, Dec. 7.—Bear Gulch is situated in the town of Summit, 2,100 feet above sea level and 1,100 feet above Main street in Richmondville, and is located nearly at the summit of one of the highest mountains in Schoharie county. It is two and a half miles directly south of Richmondville, and at the head of a very narrow valley.

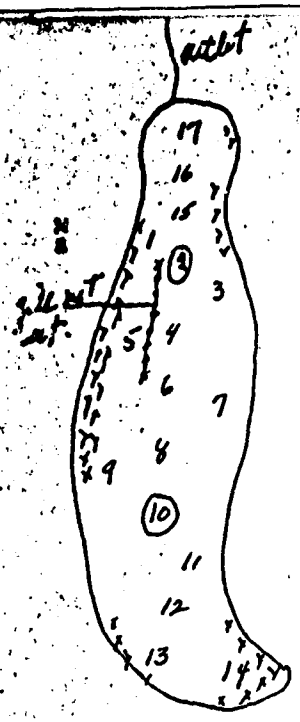
The pond when full contains nearly 100 acres of water, and while quite narrow is about one mile long. The average depth is five feet. Directly underneath the hill and at a fall of 900 feet, are numerous farms with large houses and well-kept barns. The head of the dam until recently, had been allowed to fall in decay and caused much worry among farmers and the citizens of the village. The matter was brought before the state authorities, and repairs have been made.

The pond was built about sixty years ago by the late John Westover as a storage reservoir for the numerous mills located along that stream, and is now owned for that purpose by the Richmondville Power company. For many years the pond has been noted for its good fishing. Last winter the pond was drawn down for safety, and when the ice went out in the spring thousands and thousands of pickerel and perch were found to have been frozen to death.

DEC

BEAR GULCH POND

(1934



(Outline sketch of lake or pond)

1 - 13' - 69°
2 - 13' - 69°
3 - 11' - 69°
4 - 12' - 69°
5 - 11' - 70°
6 - 11' - 71°
7 - 11' - 71°
8 - 11' - 71°
9 - 10' - 70°
10 - 10' - 70°
11 - 9' —
12 - 10' —
13 - 9' - 70°
14 - 8' —
15 - 14' - 69°
16 - 15' - 70°
17 - 15' - 70°

(Indicate principal weed beds, type of bottom and points where soundings were taken on sketch; also indicate, by numbers, points where collections were taken)

Area 51.8 acres Elevation 2,100'

If posted: Owner's name and address

Bottom: clay, gravel, marl, muck, rock, sand (underline; give % of each type) some mud

Vegetation: scant, fair, abundant, floating, submerged (underline; give % of each type)

Source: springs in bottom, spring streams, surface water (underline)

Shore line: wooded, swampy, cultivated, (open)

Color of water: white, light brown, brown

Height of dam if present 25 a' long X 10' high - old farm dam

Accessibility: road, trail, portage

NYSDEC BUREAU OF FISH + WILDLIFE

Reg. No. 55, FG16Mh33 (16-5415)

Drainage Mohawk - Hudson Coll. no. N.C.S. #47

Locality P596 Bear Gulch Lake - 19-63-M82-H240

County Schoharie Quadrangle Richmondville Elevation 2100

Water WW

F3-5

January 2, 1970

Mr. T. P. Curran
Department of Transportation
Division of Water Resources
50 Wolf Road
Colonie, New York 12205

Dear Sir:

Report on Inspection of Dam No. 474
at Outlet of Bear Gulch Pond
Town of Summit, County of Schoharie

Transmitted herewith are two sets each of copies of an inspection report and records pertaining to the above referenced subject matter.

Please keep this office informed of your determination of the action to be taken in this case by the Water Resources Commission under the provisions of Section 429-e of the Conservation Law.

Very truly yours,

E. V. HOURIGAN
Acting Deputy Chief Engineer

By

A. W. MOON
Asst. Deputy Chief Engineer

RCK/JEP/db
Encl.

DEC

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION

Inter - Office Correspondence

Date: January 2, 1970

To: E. V. HOURIGAN

From: J. E. PECK

Subject: REPORT ON INSPECTION OF DAM NO. 474
AT OUTLET OF BEAR GULCH POND
TOWN OF SUMMIT
COUNTY OF SCHOHARIE

On Monday, December 22, 1969, an inspection of the above referenced dam was made in company with Jeremiah Dineen, Division of Water Resources, Albany, and James S. Van Deusen, Superintendent of Highways for the County of Schoharie.

This dam is located about 1.5 miles northwest of the Hamlet of Summit and is situated on the headwaters of Bear Gulch Hollow Creek. The area draining into the impoundment was planimetered and found to be about 500.0 acres.

A search of our records revealed the dam to have been built in about the year 1871.

Insofar as it could be determined from the data containined in a dam report, dated July 16, 1920, the structure is an earth embankment with a laid-up rock facing on the downstream side. The foundation under the dam is of rock fill. The bed of the spillway portion of the dam was of stratified rock. The width of the top of the dam was about 18.0 feet and the height of the dam from the stream bed to the top of the dam was about 20.0 feet.

In the records were negatives of two photographs, taken about November 9, 1911, showing the then existing perilous conditions at the spillway entrance and outlet.

On the date of this inspection, the entire area in the vicinity of the dam was thickly oovered with snow and the top waters of Bear Gulch Pond were frozen. However, water was observed to be flowing into the spillway outlet section located at the West Side of the dam. It was also noted that the top of the embankment at the spillway section was about 2.0 feet higher than the top of the remaining section of the dam. At this lower elevation of the top of the dam, there was about a 1.0 foot free board down to the frozen top of the pond.

The spillway outlet section on the date of this inspection consisted of about a 6.0 ft. width by 5.0 ft. height by 12.0 length opening. The sides of the opening were concrete abutments, upon which abutments rested steel I-Beams with steel-plate formed arches between the beams. About a one inch wide settlement crack, extending from the top to the bottom was noted in

DEC

The east abutment. Some deteriorated concrete was also noted along the base of the east abutment. The floor of the opening is a concrete slab about a 1.0 ft. in thickness, the surface of which is cavitated because of the outflowing waters. Fitted symmetrically into the opening at the south end is a 4.0 ft. diameter by about a 15.0 ft. length boiler pipe of riveted steel plates. The pipe is held in place at its exterior sides by laid-up stone and earth fill extending the full length of the pipe. The invert elevation of the pipe is about two inches above the concrete floor slab.

It is quite obvious from the above statements that the boiler pipe at its present location reduces the effectiveness of the spillway opening by about 41 percent.

As was previously stated, the snow cover in the immediate area of the dam prevented a more thorough visual inspection of the structure. There is no doubt that the lower elevation of the top of the dam and the limited area of the boiler pipe opening will be conductive to cause an overtopping the dam when a rain and thaw cycle occurs over the drainage area.

In view of the differences in above-sea-level elevations between the elevation of Bear Gulch Pond and the elevation at the center of the Village of Richmondville (located about 3.0 miles downstream from the dam) of 1000 ft. (2100.0 ft.-1100.0 ft.), it is my opinion that the existing structure should be assigned a "Class C" hazard classification.

Until a more thorough inspection is made of the structure, the following safety measures are recommended:

1. Remove the existing boiler pipe, and by use of steel cribbing or concrete abutments lined-up with the existing abutments so enlarge the spillway opening.

2. Span the opening with I-Beams and a solid or grid deck to carry the roadway traffic.

3. Place a thick concrete slab or a bed of heavy rip-rap at the bottom of the opening.

4. Raise the lower part of the dam to the existing roadway elevation at the spillway by placing compacted earth fill on top of a scarified surface of the dam and place dumped rip-rap on the upstream side of the newly formed embankment.

DEC

Since there is an uncertainity concerning the responsibility for the maintenance of the dam between the owner of the dam, the Richmondville Water Power Co., and the Town of Summit, it is suggested that some agreement be reached between the parties involved before any emergency work on the dam is begun.

End of report.

John E. Peck
Senior Civil Engineer

RCK/JEP/db

Cc: T.P. Curran

DEC

STATE OF NEW YORK
WATER RESOURCES COMMISSION

CONSERVATION DEPARTMENT, ALBANY, NEW YORK 12226

January 8, 1970

Mr. James S. Van Deusen
Superintendent of Highways
Schoharie County
Schoharie, New York

Dear Mr. Van Deusen:

Dam No. 474
Bear Gulch Pond
Town of Summit
Schoharie County

A field inspection was made of the above dam on December 22, 1969 by John Peck, Senior Civil Engineer of the Department of Transportation and Jeremiah Dineen, Senior Hydraulic Engineer, Department of Conservation, at which time the conditions at the site were discussed with you. As you know, heavy snow on that date and ice on the pond precluded a complete visual inspection of the structure.

As per your request of that date, we are enclosing copies of the correspondence file relating to this dam from the Department of Transportation files. These records indicate that the structure, which was built in or about the year 1871, is owned, or at least was formerly owned by the Richmondville Water Power Company. We do not know if this company is still in existence. The Town of Summit, upon petition of a former owner of the dam, laid out a highway across the crest of the dam. Correspondence from the Town of Summit in 1911 appears to indicate that the Town only assumes responsibility for maintenance of the roadway for the purpose of travel and for no other purpose. Therefore, it would appear that the Power Company is responsible for maintenance or repair of the dam and appurtenant structures. However, since 1911 the Town of Summit may have incurred additional responsibilities by continuous use of the dam as a bed for a roadway. The separate responsibilities of the Power Company and the Town of Summit could only be defined by legal counsel.

The files on the dam indicate that the structure is an earth embankment with a hand-placed stone downstream face with a rock-fill foundation on a rock strata original ground. The original width of the top of the dam was about 18 feet, and the height above the stream bed, 20 feet.

DEC

The inspection report indicates that the crest of the road is now a town highway and water was observed flowing into the spillway outlet section located on the west side of the dam. The top of the dam is about two feet higher at the spillway section than at the center of the dam. The water level in the pond on the date of inspection was only one foot below the top of the dam at the center of the structure.

The spillway outlet section is a concrete box structure 6 feet wide by 5 feet high by 12 feet long with concrete abutments and roof consisting of steel I-beams and steel plate arches supporting the roadway section. The concrete floor and abutments are quite deteriorated with some cracks observed in the concrete. A 15 foot length of riveted steel plate boiler tube 4 feet in diameter has been placed in the south end of the concrete box section to provide a wider roadway. The pipe is held in place with hand-placed stones to form a transition section to the concrete box section and the invert of the pipe is about 2 inches above the concrete floor slab.

The drainage area tributary to Bear Gulch Pond is approximately 500 acres and during heavy runoff periods the carrying capacity of the pipe spillway could be exceeded so that water in the pond would raise above the low section of the dam and overtop the dam.

A more thorough inspection of the structure will be made when weather conditions permit.

As a minimal measure to insure safety of the structure, it is recommended that:

1) The roadway be brought up to grade and made level across the entire traverse of the dam so that all sections of the crest of the dam are at the same elevation as the road over the outlet section.

2) The steel boiler tube be removed and replaced with a concrete box structure with a concrete floor similar to, tied into, and at the same invert elevation as the existing concrete structure.

3) The upstream force of the dam be riprapped from dam crest to an elevation two feet below the invert of the spillway. Field stones from local sources may be available that could be used for riprap.

In view of the fact that this type of construction is similar to normal highway construction repair projects, I would recommend that the County and Town Highway Departments contact the owner to see if some amicable solution for allocation of costs and responsibilities for construction can be arrived at between the parties. I am sure

DEC

the Highway Department could do this type of work at less cost for the owner than private contractors. Under the above conditions we will waive the state requirements of plans and specifications prepared by a professional engineer as long as the County Highway Department supervises design and construction.

In event the County and Town officials are unwilling to negotiate as noted above, we would appreciate being advised of the name and address of the owner so he can be apprised of the conditions of the structure.

Very truly yours,

T. P. CURRAN
Central Permit Agent

Enclosures

cc: A. W. Moon
J. D. Gould
A. Makely, Supervisor
Town of Summit

DEC

STATE OF NEW YORK

WATER RESOURCES COMMISSION

CONSERVATION DEPARTMENT, ALBANY, NEW YORK 12201

February 3, 1970

Dam 474
Box 19

Mr. Maynard Tillapagth
Richmondville
New York

Dear Mr. Tillapagth:

Dam No. 474
Bear Gulch Pond
Town of Summit
Schoharie County

We have been advised that you are the owner of the dam referred to above.

On January 29, 1970, at the request of Mr. James Van Deusen, County Superintendent of Highways, an inspection was made of the condition of the dam by engineers of this office.

At that time, settlement and sliding of earth materials forming the upstream slope of the dam and shoulder of the road was occurring which, if allowed to continue, might imperil the stability of the structure. In order to reduce the hydrostatic pressure on the dam, town and county personnel partially opened the sluice gate in order to begin draining the pond. We were advised that your permission had been granted for lowering the water level.

Inasmuch as the stem of the gate is broken off below water level, scuba divers had to be used to fasten a cable to the stem so that the valve could be pulled partially open with a winch.

You are hereby advised that immediate action is required to repair the stem of the sluice gate so that the valve can be operated in such a manner so as to lower the water level in the pond at the maximum rate of discharge consistent with minimizing erosion and preventing extreme velocities at the downstream end of the drainpipe.

No attempt is to be made to impound water in Bear Gulch Pond until such time as corrective measures are undertaken to reconstruct the dam and alleviate the hazardous conditions.

DEC

Enclosed are copies of previous correspondence on the matter dated December 19, 1969 and January 8, 1970 from this office to Mr. Van Deusen.

Very truly yours,

T. P. CURRAN
Central Permit Agent

Enclosures

cc: Mr. Van Deusen
Mr. Moon
Mr. Dietsch
Mr. Gould
Supervisor Erickson

DEC

Box 19

June 16, 1970

Mr. T. P. Curran
Central Permit Agent
Department of Conservation
Division of Water Resources
50 Wolf Road
Albany, New York 12205

Reconstruction of Dam at
Bear Gulch Pond

The sketch plan showing the proposed method of reconstruction of the existing dam and spillway at Bear Gulch Pond were reviewed.

We offer the following comments for your consideration:

1. The new culvert for the service spillway should be built in accordance with the plans of the Department of Transportation for Standard Open or Closed Box Culverts.

2. Deflector walls of a 1.0 foot thickness be provided at about the center longitudinal length of the culvert in order to increase the seepage path along the perimeter of the culvert sides.

3. Since there will be vehicular traffic across the top of the dam, it is suggested that the emergency spillway be asphalt lined to prevent ruts in the spillway which could be made by the vehicles.

The other details shown on the plan are satisfactory to us.

The plan is herewith returned.

Very truly yours,

A. W. MOON

A. W. MOON
Assistant Deputy Chief Engineer

AWM/JEP/LH

Attachment

DEC

[illegible]

RB	CTY	YR AP.	DAM NO.	INS. DATE	USE	TYPE
03	46	70	000474	191170	002	3

AS BUILT INSPECTION

1	Location of Sp'way and outlet	1	Elevations
1	Size of Sp'way and Outlet	1	Geometry of Non-overflow section

1 **GENERAL CONDITION OF NON-OVERFLOW SECTION**

1	Settlement	1	Cracks	1	Deflections
1	Joints	0	Surface of Concrete	1	Leakage
1	Undermining	1	Settlement of Embankment	1	Crest of Dam
1	Downstream Slope	2	Upstream Slope	1	Toe of Slope

1 **GENERAL COND. OF SP'WAY AND OUTLET WORKS**

1	Auxiliary Spillway	1	Service or Concrete Sp'way	1	Stilling Basin
1	Joints	4	Surface of Concrete	1	Spillway Toe
1	Mechanical Equipment	4	Plunge Pool	1	Drain

1	Maintenance	B	Hazard Class
3	Evaluation	34	Inspector

COMMENTS:

1: RECENTLY RECONSTRUCTED UNDER PERMIT, UPSTREAM NEED ADD'L RIP-RAP.

DEC

DEC DAM INSPECTION REPORT CODING

1. River Basin - Nos. 1-23 on Compilation Sheets
2. County - Nos. 1-62 Alphabetically
3. Year Approved -
4. Inspection Date - Month, Day, Year
5. Apparent use -
   1. Fish & Wildlife Management
   2. Recreation
   3. Water Supply
   4. Power
   5. Farm
   6. No Apparent Use
6. Type -
   1. Earth with Aux. Service Spillway
   2. Earth with Single Conc. Spillway
   3. Earth with Single non-conc. Spillway
   4. Concrete
   5. Other
7. As-Built Inspection - Built substantially according to approved plans and specifications

Location of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications.
2. Not built according to plans and specifications and location appears to be detrimental to structure.
3. Not built according to plans and specifications but location does not appear to be detrimental to structure.

Elevations

1. Generally in accordance to approved plans and specifications as determined from visual inspection and use of hand level.
2. Not built according to plans and specifications and elevation changes appear to be detrimental to structure.
3. Not built according to plans and specifications but elevation changes do not appear to be detrimental to structure.

Size of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications as determined by field measurements using tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

Geometry of Non-overflow Structures

1. Generally in accordance to originally approved plans and specifications as determined from visual inspection and use of hand level and tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

General Conditions of Non-Overflow Section

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

(Items) For boxes listed on condition under non-overflow section.
1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.

DEC

DEC DAM INSPECTION REPORT CODING (cont.)

General Condition of Spillway and Outlet Works

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

(Items) For boxes listed conditions listed under spillway and outlet works.

1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.
4. Dam does not contain this feature.

Maintenance

1. Evidence of periodic maintenance being performed.
2. No evidence of periodic maintenance.
3. No longer a dam or dam no longer in use.

(8.)

Hazard Classification Downstream

1. (A) Damage to agriculture and county roads.
2. (B) Damage to private and/or public property.
3. (C) Loss of life and/or property.

Evaluation - Based on Judgment and Classification in Box Nos.

Evaluation for Unsafe Dam

1. Unsafe - Repairable.
2. Unsafe - Not Repairable.
3. Insufficient evidence to declare unsafe.

River Basins	Counties	
(1) LOWER HUDSON	1 Albany	56 Orange
(2) UPPER HUDSON	2 Allegany	57 Orleans
(3) MOHAWK	3 Bronx	58 Oswego
(4) LAKE CHAMPLAIN	4 Broome	59 Otsego
(5) DELAWARE	5 Cattaraugus	60 Putnam
(6) SUSQUEHANNA	6 Cayuga	61 Queens
(7) CHEMUNG	7 Chautauqua	62 Rensselaer
(8) OSWEGO	8 Chemung	63 Richmond
(9) GENESEE	9 Chenango	64 Rockland
(10) ALLEGHENY	10 Clinton	65 St. Lawrence
(11) LAKE ERIE	11 Columbia	66 Saratoga
(12) WESTERN LAKE ONTARIO	12 Cortland	67 Schenectady
(13) CENTRAL LAKE ONTARIO	13 Delaware	68 Schoharie
(14) EASTERN LAKE ONTARIO	14 Dutchess	69 Schuyler
(15) SALMON RIVER	15 Erie	70 Seneca
(16) BLACK RIVER	16 Essex	71 Steuben
(17) WEST ST. LAWRENCE	17 Franklin	72 Suffolk
(18) EAST ST. LAWRENCE	18 Fulton	73 Sullivan
(19) RACQUETTE RIVER	19 Genesee	74 Tioga
(20) ST. REGIS RIVER	20 Greene	75 Tompkins
(21) HOUSATONIC	21 Hamilton	76 Ulster
(22) LONG ISLAND	22 Herkimer	77 Warren
(23) OSWEGATCHIE	23 Jefferson	78 Washington
(24) 6 CLASSE	24 Kings	79 Wayne
	25 Lewis	80 Westchester
	26 Livingston	81 Wyoming
	27 Madison	82 Yates
	28 Monroe	
	29 Montgomery	
	30 Nassau	
	31 New York	
	32 Niagara	
	33 Oneida	
	34 Onondaga	
	35 Ontario	

DEC

UNCLASSIFIED

PAGE	DTG/RELEASE			PRECEDENCE		CLASS	SPECAT	LMF	CIC	ORIG/MSG IDENT
	DATE-TIME		YR	ACT	INFO					
01 of 02	080900	MAY	81	PP	PP	UUUU				

BOOK | MESSAGE HANDLING INSTRUCTIONS

FROM: DISTRICT ENGINEER, CORPS OF ENGINEERS
NEW YORK DISTRICT, NEW YORK 10278

RECEIVED
MAY 14 1981
C.T. MALE ASSOCIATES, P.C.

TO: HONORABLE HUGH L. CAREY
GOVERNOR OF NEW YORK
ALBANY, NEW YORK 12224

INFO: MR. GEORGE KOCH
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL
CONSERVATION
50 WOLF ROAD
ALBANY, NEW YORK 12233

INFO: MR. MAYNARD TILLAPAUGH
98 NORTH GRAND STREET
COBLESKILL, NEW YORK 12043

UNCLAS

1. ENGINEERS FROM THE FIRM OF C.T. MALE ASSOCIATES, P.C., UNDER CONTRACT TO THE NEW YORK DISTRICT, CORPS OF ENGINEERS, INSPECTED BEAR GULCH POND DAM (I.D. NO. NY 1089) IN SCHOHARIE COUNTY ON 5 MAY 1981 AS PART OF THE NATIONAL DAM INSPECTION PROGRAM.

2. VISUAL INSPECTION OF THE DAM REVEALED THE FOLLOWING CONDITIONS:

A. A DOWNSTREAM PORTION OF THE DAM ADJACENT TO THE LEFT ABUTMENT HAS SLOUGHED (FALLEN AWAY) DUE TO SEEPAGE THROUGH THE DAM. THIS SECTION IS AN AREA ENCOMPASSING APPROXIMATELY 1500 CUBIC FEET OF THE DAM.

B. WATER IS FLOWING AT THE RATE OF APPROXIMATELY 50 GALLONS PER MINUTE FROM THE DAM 30 FEET TO THE RIGHT OF THE 18 INCH OUTLET PIPE. THE FLOW VARIED DEPENDING ON WHETHER THE DRAINAGE GATE IS OPENED OR CLOSED.

6 5 4 3 2 1 0

DISTR:

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE	SPECIAL INSTRUCTIONS
RICHARD MARALDO NANEN-G X9080 CHIEF, CIVIL PROJECTS MANAGEMENT BRANCH	
RELEASER: TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE: W.M. SMITH, JR., COLONEL, DE, X0100	
RELEASER: SIGNATURE	SECURITY CLASSIFICATION: UNCLASSIFIED / DATE TIME GROUP

DD FORM 1 MAR 70 173/1 PREVIOUS EDITION IS OBSOLETE #U.S. G.P.O. 1980-320-000/5434

COE

3. AN IMMEDIATE HAZARD EXISTS DUE TO THE LOCATION OF SEVERAL DWELLINGS RANGING FROM 1/4 MILE TO 1 1/4 MILES DOWNSTREAM FROM THE DAM. THE VERTICAL DROP THROUGH THIS AREA IS AS MUCH AS 700 FEET. THE HAZARD CONTINUES TO EXISTS APPROXIMATELY 3 MILES DOWNSTREAM FROM THE DAM WHERE THE VILLAGE OF RICHMONDVILLE IS LOCATED. HERE THE STREAM FLOWS THROUGH THE VILLAGE AND THE VERTICAL DROP FROM THE DAM IS NOW APPROXIMATELY 1000 FEET.

4. THE ABOVE IS CONSIDERED TO REPRESENT AN UNSAFE CONDITION REQUIRING IMMEDIATE ATTENTION AND ANALYSIS BY THE OWNER, MAYNARD TILLAPAUGH, 98 NORTH GRAND STREET, COBLESKILL, NEW YORK, 12043, AS INDICATED BELOW:

A. THE OWNER SHOULD IMMEDIATELY DEWATER THE POND UNTIL THE UNSAFE CONDITION IS REMOVED TO THE SATISFACTION OF THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION.

CF:
Mr. Thomas P. Bennedum, P.E.
C.T. Male Associates, P.C.

COE

State wants to drain lake, strand vacationers

By KIM HUEMMEL
Schoharie County news bureau

SUMMIT — State officials say Bear Gulch Lake in Summit must be drained dry to avoid disaster if the lake's faulty earthen dam fails.

Local land owners who maintain camps on the 30-acre manmade lake protest that such action would jeopardize the small summer colony there.

State conservation officials two weeks ago ordered Maynard Tillapaugh, who owns the 30 acres under the mile-long lake, to begin draining Bear Gulch to relieve pressure on the 20-foot-high dam, now more than a century old.

While local landowners and Schoharie County officials say they want to meet with the state about problems at Bear Gulch, the state says there is no chance for compromise.

"There's not really much to talk over," said George Koch, who works in the dam safety program of the state conservation department. "We've got to prevent any type of disaster from occurring."

C.T. Male Associates, a Schenectady engineering firm, inspected the Bear Gulch dam on May 5.

The engineers found water leaking through the dam at approximately 50 gallons a minute and found that a section of road crossing the top of the dam had fallen away near one abutment, according to a telegram sent to Tillapaugh.

"The above is considered to represent an unsafe condition requiring immediate attention and analysis by the owner," the telegram said.

The engineers said an immediate danger exists to people living from one-quarter to one-and-a-quarter miles downstream from the dam, as well as to the Village of Richmondville, three miles downstream.

Bear Gulch Lake, which contains about 114 million gallons of water when full, presents a danger because it rests 1,000 feet above Richmondville, Koch said. That means if the dam gave way, the water would come pouring out, Koch said.

Three people who own property on or near Bear Gulch say the lake should be drained only until it stops leaking.

"My theory is that the dam has been there 120 years and probably will be for another 120 years," said Lowell Greene, owners of a Bear Gulch camp since 1955.

Greene said the lake has always leaked through the dam to some extent.

"It's very easy for a state agency to come in and tell you what to do," Greene said.

The Bear Gulch Lake Association, headed by Marion Bird, formed two years ago in case any problems should arise. About 50 of the 80 nearby camps stand on the lakefront. Most of the camp owners come from New Hork City and Long Island, Mrs. Bird said.

"They hate it," Mrs. Bird said of proposed draiming. "Nobody wants to see it (the draining) done."

Schoharie County officials doubt the leak in the dam poses any immediate problem.

Continued on Page 13

Today's chuckle

A tax accountant is a person who solves a problem you didn't know you had in a way you don't understand.

The Daily Star

Vol. 90, No. 229 ©Copyright 1981 The Daily Star Oneonta, N.Y., 13820, Tuesday, May 19, 1981 2 Sections 24 Pages Suggested Price 25c

F3-21

State wants to drain lake dry . . .

(Continued from Page 1)

"The state feels that it poses a threat," said Kevin Neary, Schoharie County civil defense director. "I don't."

During an inspection of the dam Monday, Neary showed how the leak had dwindled to a trickle.

Neary also questioned the engineers' 50-gallon-a-minute estimate of the leak. The engineers draw their findings by merely looking at the dam rather than measuring the rate of the leakage with precise instruments, Neary said.

"The problem I have is the state has not made a recommendation on how we can correct th eproblem," Neary said.

The state said it would take two to three months before it would give any recommendations. By then Bear Gulch will be a mudhole, according to Neary and Summit Town Supervisor Edwin Dimmer

The water level in the lake drained down about three feet in the past two weeks, Neary estimated.

If the lake is drained completely, it will deprive camp owners of its recreational uses, and will also take away a source of water for firemen, local officials said.

"I say it would be a grave mistake for them ever to drain that lake during the summer months," Dimmler said.

Schoharie County officials propose moving the road crossing the top of the dam about 25 feet toward the lake to relieve pressure on the dam and steer the road away from the downstream side of the dam.

The job could be done in two days and would keep the water in Bear Gulch until a permanent solution to the leaking is found, they said.

"I think that's the most reasonable and feasible way," Dimmler said.

Draining the lake also would create odor problems from dying fish, the Schoharie officals said.

Maynard Tillapaugh, a Richmondville feed mill owner, said he is the man caught in the middle.

Forced by the state to drain Bear Gulch, Tillapaugh also said he is hearing from camp owners about losing the lake.

"I'm going to get shot," Tillapaugh said, referring to the landowners.

Bear Gulch Lake is believed to have been built in the late 1800s to supply water power to downstream saw mills. Tillapaugh said his Richmondville grist mill was built in 1916.

The original dam on Bear Gulch Lake was built in the 1860s and is now underwater, Tillapaugh said. The dam causing the recent concern came sometime later.

The lake drains into a stream that flows into Cobleskill Creek behind Richmondville Central School, Tillapaugh said.

Camping season on Bear Gulch usually begins on Memorial Day weekend and continues until September. Camp owners say they want use of the lake until season's end unless a serious danger exists.

Tillapaugh said he doubts the state will change its mind about draining Bear Gulch.

"I don't think the state is even interested in anything like that," Tillapaugh said.

Radioactive label was misleading

WORCESTER — A tractor-trailer, mislabeled as carrying radioactive cargo, triggered an investigation here by the state Department of Environmental Conservation.

DEC officer John Karker said the truck, bearing a star-shaped warning sign, was parked by an area trucker along Route 7 Sunday between Worcester and East Worcester.

But Karker said Monday he found the truck was empty and posing no danger.

The warning sign, he said, was of a type that can be rotated to identify various kinds of hazardous cargo. In this case, he said, the sign had been left at radioactive.

Times-Journal

105th year — no. 20 Cobleskill, NY May 20, 1981 3 sections, 52 pages 25¢

F3-22

To repair Bear Gulch dam

State wants lake to be drained

If state officials have their way, Bear Gulch Lake in Summit, one of Schoharie County's prime vacation areas, may not be much of a summer spot this year because the lake may be dry.

The state Department of Environmental Conservation (EnCon) and an engineering firm working for the Army Corps of Engineers, has determined that the dam at the northern end of the lake is unsafe. They have ordered Maynard and Evelyn Tillapaugh, owners of the dam, to "dewater" or drain the lake.

Lakeside residents and local officials, however, are concerned that the draining would not only ruin the summer season but also take away one of the Summit Fire Department's water supply sources. About 50 of the 80 summer camps and homes in the area are on the shoreline.

George Koch, chief of EnCon's Dam Safety Section, and C.T. Male, a Schenectady engineering firm, inspected the earthen dam earlier this month.

The inspections found that water was leaking through the dam at about 50 gallons per minute and that seepage had washed away much of the slope, Mr. Koch said.

"We both reached the same conclusion, that the dam is unsafe and is an emergency," Mr. Koch said.

He added that there is a danger to residents living between one-quarter to one-and-a-quarter miles downstream from the 30-acre lake as well as to the Village of Richmondville.

"If the dam goes out, there's really no place for the water to go," Mr. Koch said. "It could flood the whole Village of Richmondville."

He explained that the lake, between 700 and 1000 feet above Richmondville, contains 114 million gallons of water. If the dam broke, that amount of water would carry large rocks and other debris with it, he said.

The temporary solution, according to Mr. Koch, is to drain the lake, and the Tillapaughs are complying with that decision. The lake drains into a stream that empties into Cobleskill Creek near Richmondville Central School.

"We're trying to cooperate by letting the water out gradually," Mrs. Tillapaugh said.

Mr. Koch reported that in three months, the state will issue a report "pinpointing what the problems are and why the dam is unsafe."

Kevin Neary, county director of the Office of Disater Preparedness, doubted that the danger was as immediate as Mr. Koch believed. He also questioned the wisdom of draining the lake now, then waiting three months for the results of a study.

"Why do they want to wait three months before they make any recommendations?" he asked. "They haven't given any guidelines about repairing the dam."

Mr. Neary also wondered why a more thorough inspection of the dam wasn't made before the draining order was sent to Mr. Tillapaugh. He said that the engineers merely made a visual inspection of the dam.

Marion Bird, president of the Bear Gulch Lake Association, agreed with Mr. Neary. "I don't see why they can't put on wet suits, go underwater and see what the real problem is," she said.

Residents and officials are angry that the state appears unwilling to compromise by draining the lake after the summer season.

"I'm not in favor of draining the lake at this time of year," said Summit Supervisor Edwin Dimmler. "I think they should let a little bit of water out now and wait a couple of months before draining it."

The vacation season begins this Saturday, the start of Memorial Day weekend, and continues until Labor Day weekend. Draining the lake will, of course, take away it's boating and fishing recreational uses.

"It's too bad they can't wait till the end of August, when it begins to get cool, or after Labor Day," Mrs. Bird said.

Mr. Neary is planning to call a meeting with engineers, state and local officials and members of the lake association to explain the situation.

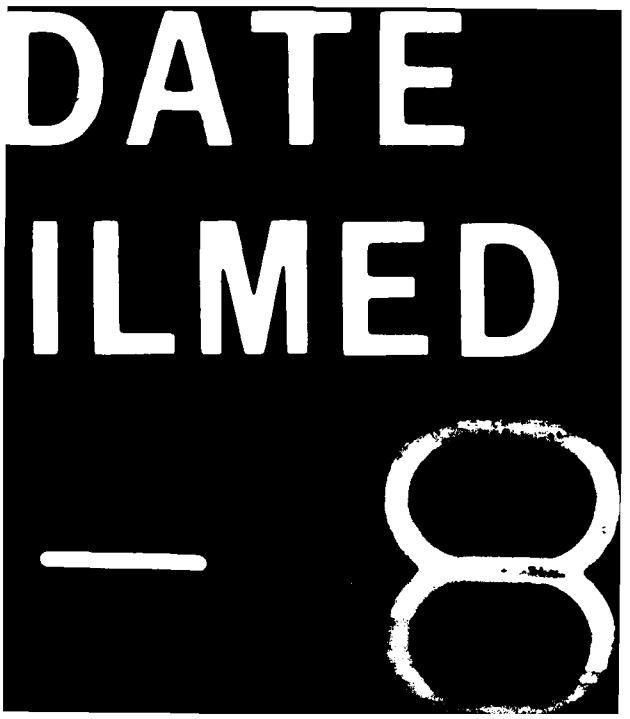
"Everybody's just got to keep a cool head and be understanding," Mrs. Bird concluded. "There's not a whole lot we can do."

Outlook optimistic for summer tourism

APPENDIX G

DRAWINGS

NO DRAWINGS AVAILABLE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